

OSAKA

ECONOMIC PAPERS

VOL. VIII (2)

MARCH 1960

NO. 17

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OSAKA ECONOMIC PAPERS

VOLUME VIII

March 1960

NUMBER 2

EXTERNAL ECONOMIES AND INTERNATIONAL TRADE

TARŌ WATANABE

I

The aim of this paper is to examine what modifications the existence of external economies imposes on the doctrine of comparative costs, fundamental principle of international trade. This inevitably qualifies the kind of external economies to be dealt with here.

As is well known, Marshall is the first who put the concept of external economies into the tool-box of economic analysis. He divided the economies in costs into two classes that often result from an increase in output, firstly those dependent upon the size of output of the individual firm, and secondly those upon the size of output of the industry as a whole. He called the former internal economies and the latter external economies¹.

The prevailing view is that internal economies inevitably bring monopoly into existence and so are incompatible with perfect competition. It follows from this that in case internal economies exist, the comparative costs are no longer the decisive factor in the international flow of commodities, which is clearly inconsistent with what the doctrine of comparative costs tells us. Thus, the existence of internal economies is, we may say, destructive to the doctrine. If external economies were inseparably connected with monopoly, as is the case with internal economies, it is obvious that our aim stated at the outset of this paper would be almost of no sense. Fortunately, this is not the case. There exists such a specific kind of external economies as is compatible with

¹ Alfred Marshall, *Principles of Economics*, 8th reset edition, London, 1949, p. 221.

perfect competition², which is the one we are concerned with in this paper.

I request the reader to remember that I have no intention of advocating the ubiquity of this kind of external economies. Rather, I plainly accept the criticism³ that it is very difficult to find its' examples in the real world. This compels me to admit that my study is only of limited application. At the same time, it contributes, I am sure, to confirm (or to modify if necessary) the validity of the doctrine of comparative costs on the one hand, and to clarify the relationship between external economies and international trade on the other.

II

Let us begin by specifying some assumptions which help to set limits to the sphere of our problem. Firstly, according to the traditional procedure, we suppose the world of two-countries and two-commodities, two countries being Japan and Foreign Country, tow commodities cloth and wheat. Secondly, the prices and costs of the commodities are measured in terms of labor. We need not stick to this measure, however. It is sufficient to us if we can express absolute rises or falls in prices and costs. By price-ratio and cost-ratio, which are more often referred to later, we mean respectively the price- and cost-ratio of cloth to wheat, not the reverse. Thirdly, we assume perfect competition and feasibility of long-term equilibrium. Fourthly, we assume also that external economies or diseconomies accruing to a firm solely depend upon the scale of output of the industry whose member it is and upon nothing else. That is to say, we assume that an increase (a decrease) in the output of one industry as a whole lowers (raises) the costs of production of the individual firms belonging to that industry, but that it has no influence upon those of the firms belonging to the other industry.

The key to our problem is to be found in the nature of demand and

² It was Marshall's primary purpose in designing the concept to make sure of the existence of this kind of external economies.

³ Cf., for example, Piero Sraffa, "The Laws of Returns under Competitive Condition", *Economic Journal*, 1926, reprinted in *Readings in Price Theory*, London, 1953, p. 186; Jacob Viner, "Cost Curves and Supply Curves", *Zeitschrift für Nationalökonomie*, 1931, reprinted in *Readings in Price Theory*, pp. 17-22.

supply. As to the demand curve, there is no need to dwell upon it. We shall only assume it, as is usually the case, to be downward-sloping. As to the supply curve, however, a somewhat detailed explanation may be necessary. In Fig. I there is depicted the downward-sloping supply curve of cloth⁴. Here I wish to call the readers' attention to the manner in which the price-ratio of cloth to wheat, not the absolute price of cloth, is measured along the vertical axis. Why is it that the supply curve depicted there is not upward-sloping as is usual, but is downward-sloping?

The industry supply of cloth is the sum total of the output of the member firms. In the long-run equilibrium under perfect competition, the output of cloth of a particular firm is determined at the level where both the marginal and the average costs of production are equated to the price. The same is true of wheat. Therefore, more generally we may say that the output of a commodity is determined at such a level as to equate the cost-ratios to the price-ratio. At any rate, since in the long-run equilibrium the output of a firm is uniquely definite, the industry supply solely depends upon the number of the member firms. Further, how many firms are reckoned among the cloth industry solely depends upon the demand for cloth. For, on our assumptions, a firm is ready to move from one industry to the other, conforming to changes in demand at the ruling price-ratio. What has been stated here holds good independently of whether there exist external economies or not.

Now we suppose that at a certain price-ratio we are facing a certain definite demand for cloth and correspondingly a certain definite supply of it. Then we suppose that there occurs a shift in demand from wheat to cloth. It will result in an increase in the industry supply of cloth and in a decrease in that of wheat. External economies and diseconomies being assumed to exist, this operates to lower the cloth's cost of production and to raise the wheat's. Accordingly, after the long-run equilibrium

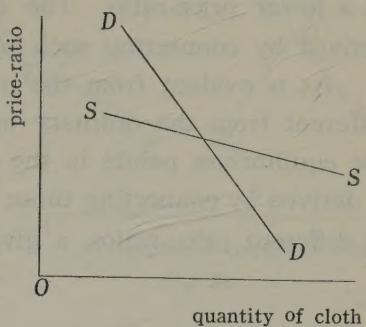


Fig. I

⁴ It is indifferent, for the time being, whether it is Japan's or Foreign Country's.

has again been arrived at, there necessarily rules a certain lower price-ratio than before. It follows from the above that more cloth is supplied at a lower price-ratio. The downward-sloping supply curve in Fig. I is derived by connecting such equilibrium points one after another.⁵

As is evident from the procedure of deriving it, our supply curve is different from the ordinary one. The former is derived by connecting the equilibrium points in the different states of demand, while the latter is derived by connecting those points which indicate the quantities supplied at different price-ratios, a given state of demand being assumed.

III

Let us suppose that the states of cloth market before trade in both countries are such as are shown in Fig. II respectively. The equilibrium in isolation is at Q_j in Japan and at Q_f in Foreign Country; the then price-ratios are O_jP_j and O_fP_f respectively.

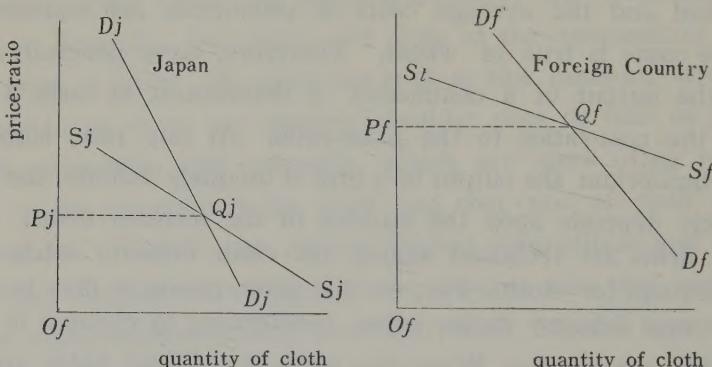


Fig. II

In the figure, $O_jP_j < O_fP_f$. This tells us that before trade Japan has comparative advantage in cloth and Foreign Country in wheat. Trade being opened in such circumstances, Japan will specialize in the production of cloth and Foreign Country in the production of wheat. This is exactly what the doctrine of comparative costs indicates.

Hereafter we shall confine our attention to cloth. In Fig. III are depicted Japan's export supply curve of cloth $EFGH$ and Foreign Country's import demand curve of cloth $IJKL$. Both of them have peculiar shapes,

⁵ Cf. Viner, "Cost Curves and Supply Curves," pp. 18-19.

the main part of which is directly derived from Fig. II.

OE and OI correspond respectively to O_jP_j and O_fP_f in Fig. III which in turn indicate Japan's and Foreign Country's price-ratios in isolation. Thus we know that the farther the distance between E and I , the larger is the difference in comparative costs before trade.

As is suggested from Fig. II, Japan is capable of exporting cloth at a lower price-ratio than prevailing in isolation, provided that there comes a demand for it from abroad. What is more, she is ready to export more cloth at lower price-ratios, in so far as external economies do exist. This is indicated by EF , downward-sloping portion of the export curve.⁶

Growth of an industry will eventually be followed by exhaustion of external economies. The exhaustion may come just when or before all the factors of production in Japan are put into the production of cloth. We prefer the latter of the suppositions as the more general case of the two. After exhaustion of external economies, output is expanded at a constant cost. On our assumption of perfect competition, it means that the supply of cloth is perfectly elastic at a certain price-ratio. In correspondence with the total supply, the export of cloth also becomes perfectly elastic over a certain definite range, which is FG , portion of the export curve parallel to the horizontal axis. F corresponds to the point where external economies are exhausted, and G is the point which indicates the supply of export at the time when all the factors of production in Japan are put into the production of cloth. In case external economies are not exhausted until Japan completely specializes in cloth production, F , of course, coincides with G .

In so far as cloth is exported from Japan, it is impossible for the price-ratio to be lower than the one indicated at F or G . For, if it

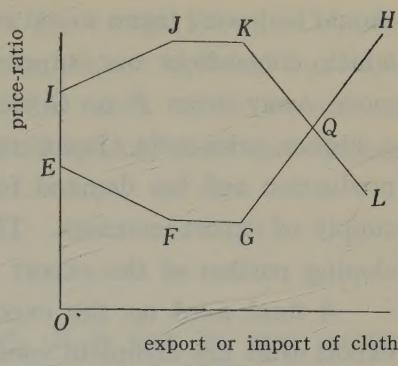


Fig. III

⁶ It should be remembered that as to the individual firms the equality between price-ratio, marginal and average cost-ratios remains unchanged.

should be lower, Japan would completely abandon the production of cloth, which contradicts our supposition. Therefore, if the price-ratio is to move away from *F* or *G* along the curve, it must move upward. At a higher price-ratio, Japan remains in complete specialization in cloth production and her demand for cloth decreases, with the result that her supply of export increases. This relationship is indicated by *GH*, upward sloping portion of the export curve.

A final word on the export curve. *GH* express Japan's supply of export after her complete specialization in cloth production, and *EF* and *EF'* those before it.

Analogous explanation may be given to Foreign Country's import curve of cloth. Once trade is opened, Foreign Country's demand for cloth is met with by imports from Japan in place of her domestic production. The replacement by the imports may be complete or partial. The latter case occurs when Japan's capacity to supply cloth is insufficient to meet Foreign Country's demand for it. The larger the extent of replacement, the more sharply contracts Foreign Country's production of cloth. In so far as there is any room for external diseconomies, contraction of production tends to a rise in cost and accordingly in price-ratio. This relationship is indicated by *IJ*, upward-sloping portion of the import curve, where a larger import demand corresponds to a higher price-ratio.

After exhaustion of external diseconomies, production contracts at a certain constant cost. Then, the total supply becomes perfectly elastic over a certain range, and over the corresponding range the import also becomes perfectly elastic. This is shown by *JK*, portion of the import curve parallel to the horizontal axis, where *J* corresponds to the point at which external diseconomies are exhausted in Foreign Country, and *K* indicates the import demand at the time when Foreign Country has completely abandoned cloth production.

In so far as Foreign Country is importing cloth, the price-ratio never rises above that indicated at *J* or *K*. If it should, Foreign Country would try completely to specialize in cloth production instead of producing some wheat, which contradicts our supposition. Therefore, the downward movement away from *J* or *K* along the curve is the only one that Foreign

Country is permitted to choose. At a lower price-ratio, Foreign Country completely abandons the production of cloth on the one hand and increases her demand for cloth on the other, with the result of an increase in import demand. This relationship is indicated by KL , downward-sloping portion of the import curve.

IV

Our work has passed its critical point. It is now an easy matter to say something of trade equilibrium. Trade is in equilibrium at the intersection of the export and the import curves. By depicting various combinations of the curves, we can gain some knowledge of the nature of trade equilibrium.

Firstly, in Fig. III, the point of intersection is posited between the price-ratios in isolation. The reader should not jump from this to the conclusion that the equilibrium price-ratio—or we may say, the equilibrium terms of trade—is set limits by the difference in comparative costs in isolation. Indeed the conclusion is justified in the cases of increasing and constant costs. But it is not the case with decreasing costs. It is possible that the equilibrium terms of trade settle somewhere beyond the limits. The true limits are set by the price-ratios which rule when external economies or diseconomies are exhausted.

Secondly, we find the often-asserted proposition incorrect that decreasing costs due to external economies lead to complete specialization in both countries.⁷ In Fig. III we indicated such a case as to conform to the proposition, but it is feasible that the import curve cuts the export curve at its portion EF or FG , and also that the export curve cuts the import curve at its portion IJ or JK . The former case, which shows complete specialization in Foreign Country and partial specialization in Japan, occurs when Japan's supply of export is excessive relatively to Foreign Country's demand for imports. The latter case, which shows complete specialization in Japan and partial specialization in Foreign Coun-

⁷ Cf. A.P. Lerner, "The Diagrammatical Representation of Demand Conditions in International Trade", in his *Essays in Economic Analysis*, London, 1953. pp. 118-19.

try, occurs when Japan's supply of export is scanty relatively to Foreign Country's demand. Another alternative case, both countries' partial specialization fails to be feasible. For it is impossible that Japan's supply of export should be both excessive and scanty relatively to Foreign Country's demand. In short, the possible cases are (1) both countries' complete specialization, and (2) one country's complete specialization and the other's partial specialization.⁸

Thirdly, what about gains from trade? To begin with, We shall consider the case of both countries' complete specialization. In Fig. IV, the gains which accrue to Japan through trade are represented by the area $E'GQR$, and Foreign Country's gains by the area $I'KQR$, so that the gains of the world as a whole by the area $I'KQGE'$. It is evident from the figure that both Japan and Foreign Country do gain from trade.

It may be helpful to give some explanation of the diagrammatical representation of the gains from trade. Japan's average cost of cloth measured in terms of wheat after exhaustion of external economies is indicated by OE' . Therefore, provided that we are concerned only with the situation after exhaustion of external economies, Japan's export curve of cloth is to be regarded as $E'GH$ instead of $EFGH$. With this taken into consideration, the sacrifice on the part of Japan per unit of export of cloth up to OS is equivalent to OE' measured in terms of wheat. The above is not true of the units of export in excess of OS . To those units, Japan's sacrifices become bigger and bigger than OE' . After all, the total sacrifices on the part of Japan to the export of cloth OT are represented by the sum of $OSGE'$ for OS and $STQG$ for ST . Since Japan's receipts are $OTQR$ measured in terms of wheat, her gains

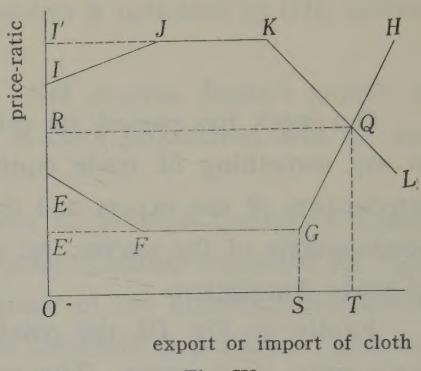


Fig. IV

⁸ The same conclusion—but by means of the reasoning different from mine—is arrived at in R.C.O. Mathews, "Reciprocal Demand and Increasing Returns", *Review of Economic Studies*, Vol. XVII (2), No. 43, 1949–50, pp. 152–53.

from trade are, on balance, equivalent to $E'GQR$. As to Foreign Country's gains from trade, analogous explanation can be given.

The total gains from trade when both countries completely specialize depend upon the difference in comparative costs, elasticities of demand, and possible rooms for external economies in both countries. It should be noted that the difference in the comparative costs no longer plays a decisive role. Even when there is found no difference in the comparative costs, some gains are expected to accrue to the trading countries, in so far as there exist any rooms for external economies. In this case, of course, we know nothing about which country does specialize in what commodity. If only each country specializes in a commodity different from each other, however, gains will accrue to her.

One country's gains depend upon both countries' elasticities of demand. Foreign Country's elasticity being supposed as given, the more elastic Japan's demand, the smaller is her share of gains likely to be relatively as well as absolutely, and the bigger is Foreign Country's share.

Without scrutinizing this matter further, we simply suppose that the terms of trade are determined at OR . Then, dual gains accrue to both Japan and Foreign Country, one through a favorable turn of the terms of trade relative to their respective price-ratios in isolation, and the other through creation of external economies. The terms of trade may be determined at a lower level than OE , owing, for example, to Japan's demand being highly elastic. (Of course, the possibility that it may be lower than OE' is out of the question.) In such a case, Japan's gains from external economies created there are offset partially by her losses due to an unfavorable turn to her of the terms of trade relative to her own price-ratio in isolation. Since offsetting is partial, not complete, some gains are left behind to her.⁹ On the contrary, Foreign Country gains not only from external economies created there, but also from a favorable turn to her of the terms of trade.

In short, we may be justified in concluding that any rooms for external economies tend to give a wider scope for trade.

⁹ It goes without saying that such a possibility is absent in the cases of increasing and constant costs.

So much for the case of both countries' complete specialization. We shall turn to the other case, that of only one country's, for example, Japan's, complete specialization in cloth. In Fig. V, trade is in equilibrium at Q , where the terms of trade are expressed by OR , and the quantity of cloth traded by OT . The terms of trade are less favorable to Japan than her own price-ratio in isolation, and are far more favorable to Foreign Country than her own one in isolation.

In this situation Japan's average cost of production of cloth is measured by OR . Therefore, the sacrifice on Japan's part to the export of cloth by OT is $OTQR$ measured in terms of wheat, while the quantity of wheat she obtains in exchange for the above quantity of export of cloth is also equivalent to $OTQR$. On balance, Japan's gains from trade are equal to zero. On the other hand, Foreign Country's gains are expressed by $I'KQR$. It follows that the gains of the world as a whole also are expressed by $I'KQR$. In other words, the partially specializing country transfers all the external economies created there to the completely specializing country, while the latter monopolizes the whole gains, that is to say, she obtains not only the external economies created in her own country, but also those created by the other. Even the partially specializing country, it deserves emphasis, however, suffers no loss from trade.¹⁰

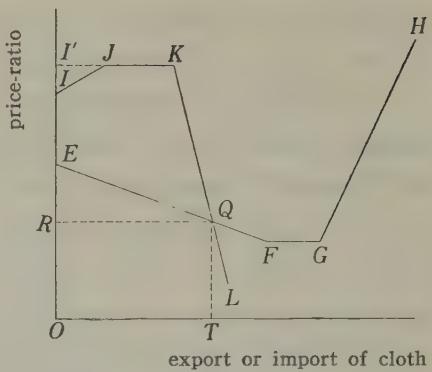


Fig. V

¹⁰ This conclusion differs from those of some economists. Their errors are, I think, due to regarding it as a condition of trade equilibrium that the ratio of social—not private—marginal costs should be equated with the terms of trade. Cf. Jan Tinbergen, "Professor Graham's Case for Protection", in his *International Economic Co-operation*, Amsterdam, 1945, Appendix I, p. 190; Mathews, *cp. cit.*, p. 152; B. Coen, "Decreasing Costs and the Gains from Trade," *Economica*, August 1951, pp. 287-89.

EFFECTS OF YIELD FLUCTUATION¹

CHIHIRO NAKAJIMA

I

It is well to say that one of the most important features of agriculture is yield fluctuation from year to year due to the changes of climatic conditions. Table 1 shows that Japanese agricultural production has been

Table 1

INDEXES OF TOTAL AGRICULTURAL PRODUCTION, RICE PRODUCTION, AND REAL NATIONAL INCOME, AND AGRICULTURAL INCOME AS % OF NATIONAL INCOME, 1950-57, JAPAN^a

| | Index of Total Agricultural Production ^b | Index of Rice Production ^b | Index of Real National Income ^b | Agricultural Income as % of National Income |
|------|---|---------------------------------------|--|---|
| 1950 | 94.7% | 101.2% | 91.7% | 21.2% |
| 1951 | 97.5 (+ 3.2) | 94.7 (- 6.5) | 99.5 | 20.3 |
| 1952 | 107.8 (+10.3) | 104.1 (+ 9.4) | 108.7 | 19.8 |
| 1953 | 93.4 (-14.4) | 86.2 (-17.9) | 117.2 | 16.7 |
| 1954 | 102.9 (+ 9.5) | 95.5 (+ 9.3) | 119.8 | 16.6 |
| 1955 | 124.5 (+21.6) | 124.5 (+29.0) | 129.7 | 18.0 |
| 1956 | 117.4 (- 7.1) | 109.8 (-14.7) | 142.8 | 14.9 |
| 1957 | 122.1 (+ 4.7) | 115.4 (+ 5.6) | 155.9 | 13.5 |

^a Sources: Column 1 and 2 from *Statistical Yearbook of Ministry of Agriculture and Forestry, Japan*; Column 3 and 4 from, Economic Planning Bureau, *Kokumin Shotoku Hakusho (White Book on National Income)*, 1957.

^b 1950-52=100%.

raised very rapidly in recent years, presumably owing to technical progresses accompanied by many sorts of agricultural investments as well as increases of inputs. However, at the same time we see considerable yield fluctuation from the table. For instance, the index of total agricultural production in a single year 1952-53 dropped by 14.4% and two

¹ I should like to express my sincere gratitude to Prof. Ohkawa of Hitotsubashi University and many other members of T.E.A. group who made valuable suggestions and criticisms. (T.E.A. is a circle of agricultural economists in Japan interested in using modern economics as an analytical tool.) Dr. A. M. Tang of Vanderbilt University has helped in bringing my English into readable form. I have benefited from Mr. Morishima's article entitled "Agriculture and Latent Unemployment", *Osaka Daigaku Keizaigaku (The Economic Review of Osaka University)*, Oct. 1954, pp. 202-16.

years later in 1954-55 jumped by 21.6%. (In Japan rice accounts for about half of agricultural gross output in value and also its yield has been susceptible to fluctuation, so that total agricultural output has been most strongly affected by the change of rice yield, as shown by the high correlation between the two indexes in Table 1.)²

This paper is intended in the first place to analyze the economic effects of a yield change in a Japanese setting by using a theoretical model that incorporates some essential features of the Japanese economy. In the second place the paper tries to derive some policy measure against unfavourable effects of a yield change, if needed. In treating these problems we adopt a method which should be called "two sector income analysis" (that distinguishes between the agricultural sector and the non-agricultural sector) and a method of "comparative statics".

II

We assume firstly that the non-agricultural sector consists of capitalistic firms and households, while the agricultural sector of family farms, i.e., "firm-household complexes". Our assumptions concerning agriculture are as follows: (1) Prices of agricultural products are fixed on certain levels by price control policy.³ (2) Domestic agricultural output is always less than the demand at controlled prices and the shortage is met by government-determined food imports.⁴ (3) Farmers do not restrict their production and their intended or "ex-ante" output approaches the upper limit and tends to be invariant (however, the "ex-post" output is apt to fluctuate as a result of fickle climatic conditions).

² In most under-developed countries the magnitude of yield fluctuation may be larger than that of Japan. Also in those economies agriculture is relatively more important than in Japan. Therefore, the effects of yield changes will be more serious in the former.

³ In Japan about 70% of gross agricultural output is at present under price control or price support which is protecting farmers from the risk of price fluctuation.

⁴ The assumption that food imports are always regulated so as to offset the difference between output and demand may be adequate as a first approximation. But it is not fully satisfied in the Japanese actual situation. The main reasons for this are as follows: (1) Japan exports various industrial products to the South-east Asian countries from whom she imports rice. Therefore, she can not reduce the rice imports from them immediately after a good crop. (2) International rice price is apt to fluctuate according to rice crops in both rice exporting and rice importing countries. Therefore, even after a good crop it is better for Japan to import extra rice if its price is very low.

As regards the non-agricultural sector we make the following assumptions: (1) Every firm adjusts its output in accordance with changes in effective demand. (2) The adjustments are made such that prices of non-agricultural products are maintained nearly constant.

Table 2 is a representation of our model in the form of an input-output table. Suffix 1 means Family Farms or farm Families, suffix 2 firms or households in the non-agricultural sector. Notations with a bar above them refer to constant or given quantities, though later we will treat agricultural output \bar{O}_1 and government investment \bar{I} as parameters.

Table 2
MODEL IN THE FORM OF INPUT-OUTPUT TABLE

| | Agriculture | Non-agr. | Consumption | | Gross Investment | Export | Import | Output |
|--------------|----------------|--|--|---------------|---------------------------------------|-------------|------------|-------------------------|
| | | | Farm Family | Household | | | | |
| Agriculture | - | \bar{A}_{12} | $C_{11}(Y_1)$ | $C_{12}(Y_2)$ | \bar{I}_{11} | - | M_1 | \bar{O}_1 |
| Non-agr. | \bar{A}_{21} | - | $C_{21}(Y_1)$ | $C_{22}(Y_2)$ | $I_{21}(Y_1) + I_{22}(O_2) + \bar{I}$ | \bar{X}_2 | $M_2(O_2)$ | O_2 |
| Depreciation | \bar{D}_1 | \bar{D}_2 | - | - | - | - | - | $\bar{D}_1 + \bar{D}_2$ |
| Income | Farm Family | $\bar{O}_1 - \bar{A}_{21} - \bar{D}_1$ | \bar{Q} | - | - | - | - | Y_1 |
| | Household | - | $\bar{O}_2 - \bar{A}_{12} - \bar{D}_2$ | - | - | - | - | Y_2 |
| | | | $-\bar{Q}$ | | | | | |

The input of non-agricultural products into agriculture \bar{A}_{21} is regarded as given since intended agricultural output is considered invariant. The assumption that \bar{A}_{12} is given is only for simplicity and as shown later it can be relaxed. $C_{11}(Y_1)$ means that reservation demand of farm families for agricultural products is a function of farm family income Y_1 . For $C_{21}(Y_1)$, $C_{12}(Y_2)$ and $C_{22}(Y_2)$ no explanation will be necessary. \bar{I}_{11} means the increase of livestock and fruit-trees, etc. and is assumed to be constant for convenience. I_{21} , investment of non-agricultural products in agriculture as carried out by family farms, is treated as a function of farm family income Y_1 . It is well to say that such a treatment is highly realistic so far as Japan is concerned. I_{22} , investment of non-agricultural products within the non-agricultural sector, is conventionally

treated as a function of the sector's output O_2 . \bar{I} , government investment, contains investment in both the agricultural and non-agricultural sectors. In this paper we consider rôles of government only in the light of its investment. The reason for this is that, as the reader will see later, government investment can be utilized as a strategic factor to control the effects of yield fluctuation (or the change of agricultural output \bar{O}_1) on the effective demand for non-agricultural products or on the external balance of payments.

We neglect exports of agricultural products in that their amount is very small in Japanese economy. Exports of non-agricultural products \bar{X}_2 are assumed as given, being principally determined by exogenous factors. M_1 means imports of agricultural products and is, as previously stated, assumed to be regulated by government to make up for the difference between output and demand in conjunction with the agricultural price control program. By M_2 we mean imports of non-agricultural products, including imports of non-locally-produced agricultural products used as industrial raw materials such as raw cotton and wool. The most important part of M_2 arises from demand from the non-agricultural sector, so that M_2 depends considerably upon the level of activities in that sector, hence it is taken as a function of O_2 . \bar{D}_1 and \bar{D}_2 are depreciations respectively in the two sectors.

In Table 2 we see at once that the net output in agriculture is represented by $(\bar{O}_1 - \bar{A}_{21} - \bar{D}_1)$, and then \bar{O}_1 must be larger than the net output. However, \bar{O}_1 may be called agricultural "net" output in the sense, and only in the sense, that it does not contain inputs of agricultural products within the sector.⁵ The same is true of O_2 .

Now from Table 2 we derive following equations :

$$(1) \quad M_1 = \bar{A}_{12} + C_{11}(Y_1) + C_{12}(Y_2) + \bar{I}_{11} - \bar{O}_1$$

$$(2) \quad O_2 = \bar{A}_{21} + C_{21}(Y_1) + C_{22}(Y_2) + I_{21}(Y_1) + I_{22}(O_2) + \bar{I} + \bar{X}_2 - M_2(O_2).$$

(1) holds necessarily by the foregoing assumption. Equation (2) represents the equilibrium condition of non-agricultural market.

⁵ Regarding this point Table 2 is different from usual input-output tables. I think that our treatment is more suitable and convenient when a small number of sectors is employed, especially in the case of econometric studies.

Let us revert to Table 2. \bar{Q} means off-farm income of farm families earned in the non-agricultural sector. Though it would be better to treat it as a function of O_2 , we assume it as given, as a first approximation. Then farm family income which we denote by Y_1 must be the sum of farm income ($\bar{O}_1 - \bar{A}_{21} - \bar{D}_1$) and off-farm income \bar{Q} .⁶ If we ignore undistributed profits, nonfarm household income must be $(O_2 - \bar{A}_{12} - \bar{D}_2 - \bar{Q})$. Then we have following two definitional equations in addition :

$$(3) \quad Y_1 = \bar{O}_1 - \bar{A}_{21} - \bar{D}_1 + \bar{Q}$$

$$(4) \quad Y_2 = O_2 - \bar{A}_{12} - \bar{D}_2 - \bar{Q}.$$

Now we have four eqations (1), (2), (3) and (4), which constitute our model. However, at first in (3) the value of Y_1 is determined. Next, by substituting (3) and (4) for Y_1 and Y_2 in (2) we obtain a single eqation which contains only one unknown O_2 . Then the equilibrium value of O_2 can be determined, and consequently that of Y_2 determined from (4) and at last that of M_1 determined from (1). In brief, if some particular value is given to \bar{O}_1 , then each equilibrium value of Y_1 , Y_2 , O_2 and M_1 is determined.

III

Here, I think, it is useful to state some additional explanation concerning the relation between our model and the concept of national income. It is apparent that in our model "national income produced" must be equal to the sum of agricultural net output and non-agricultural net output, i.e. :

$$(5) \quad \text{National Income Pröduced} \equiv (\bar{O}_1 - \bar{A}_{21} - \bar{D}_1) + (O_2 - \bar{A}_{12} - \bar{D}_2) \\ = (\bar{O}_1 - \bar{A}_{12}) + (O_2 - \bar{A}_{21}) - \bar{D}_1 - \bar{D}_2.$$

From (1) and (2) we can easily derive

⁶ As previously stated, $(\bar{O}_1 - \bar{A}_{21} - \bar{D}_1)$ means agricultural net output and under Japanese present situation it may be taken to represent total farm family income from agriculture for the following reasons. In the first place almost all the hired labor on farms is supplied from within the agricultural sector. Secondly, after the land reform, tenant operated land area has been cut down to less than 10% of total cultivated farm land, and also rent is being regulated at an extremely low level. Therefore, at present nearly all of the agricultural net output accrues to farm families.

$$(6) \quad \bar{O}_1 - \bar{A}_{12} = C_{11} + C_{12} + \bar{I}_{11} - M_1$$

$$(7) \quad O_2 - \bar{A}_{21} = C_{21} + C_{22} + I_{21} + I_{22} + \bar{I} + \bar{X}_2 - M_2.$$

Since (1) and (2) necessarily hold ex-post, (6) and (7) must also hold ex-post. By substituting (6) and (7) for $(\bar{O}_1 - \bar{A}_{12})$ and $(O_2 - \bar{A}_{21})$ in (5), we obtain

$$\begin{aligned} (8) \quad \text{National Income Produced} &\equiv (C_{11} + C_{12} + \bar{I}_{11} - M_1) + (C_{21} + C_{22} + I_{21} + I_{22} \\ &\quad + \bar{I} + \bar{X}_2 - M_2) - \bar{D}_1 - \bar{D}_2 \\ &= (C_{11} + C_{12} + C_{21} + C_{22}) + (\bar{I}_{11} + I_{21} + I_{22} + \bar{I} - \bar{D}_1 - \bar{D}_2) + (\bar{X}_2 - M_1 - M_2) \\ &= \text{Consumption} + \text{Net Investment} + \text{Excess Export} \\ &= \text{National Income Spent}. \end{aligned}$$

Next,

$$\begin{aligned} (9) \quad \text{National Income Produced} &\equiv (\bar{O}_1 - \bar{A}_{21} - \bar{D}_1) + (O_2 - \bar{A}_{12} - \bar{D}_2) \\ &= (\bar{O}_1 - \bar{A}_{21} - \bar{D}_1 + \bar{Q}) + (O_2 - \bar{A}_{12} - \bar{D}_2 - \bar{Q}) \\ &= Y_1 + Y_2. \end{aligned}$$

There will be no objection to calling $(Y_1 + Y_2)$ "National Income Distributed" in a sense. Thus, in our model equivalence of national income in three aspects holds necessarily.

IV

It would be better to examine stability conditions of our system before we pass onto an analysis of effects of yield fluctuation. Since we have assumed that the shortage of agricultural output to the demand is just met by imports, the agricultural market must be always stable. Next, as for the non-agricultural market, from (2) we see that the excess supply of non-agricultural products is represented by

$$O_2 - \bar{A}_{21} - C_{21}(Y_1) - C_{22}(Y_2) - I_{21}(Y_1) - I_{22}(O_2) - \bar{I} - \bar{X}_2 + M_2(O_2).$$

By the stability condition we mean that an increase of non-agricultural output O_2 must be accompanied by a rise in the excess supply, i.e.:

$$\begin{aligned} \frac{d}{dO_2} \{O_2 - \bar{A}_{21} - C_{21}(Y_1) - C_{22}(Y_2) - I_{21}(Y_1) - I_{22}(O_2) - \bar{I} - \bar{X}_2 + M_2(O_2)\} \\ = 1 - C'_{21} \frac{dY_1}{dO_2} - C'_{22} \frac{dY_2}{dO_2} - I'_{21} \frac{dY_1}{dO_2} - I'_{22} + M'_2 > 0. \end{aligned}$$

Since in (3) and (4)

$$\frac{dY_1}{dO_2} = 0, \quad \frac{dY_2}{dO_2} = 1,$$

the stability condition becomes

$$(10) \quad 1 - C'_{22} - I'_{22} + M'_2 > 0.$$

It will be reasonable to suppose that in Japanese economy this condition holds actually and also the value of $(1 - C'_{22} - I'_{22} + M'_2)$ is less than unity.

V

Now we shall proceed to an analysis of the effects of a change in \bar{O}_1 , or of yield fluctuation. As is previously stated, if some particular value is given to \bar{O}_1 , then each equilibrium value of Y_1 , Y_2 , O_2 and M_2 can be determined. Hereafter we regard \bar{O}_1 as a parameter. Thereby the above equations (1), (2), (3) and (4) come to imply that each equilibrium value of Y_1 , Y_2 , O_2 and M_2 is respectively a function of \bar{O}_1 , and therefore we can compute such differential coefficients as $dO_2/d\bar{O}_1$, $dM_2/d\bar{O}_1$ etc.. Substituting (3) and (4) for Y_1 and Y_2 in (2), and differentiating the resulting equation with respect to \bar{O}_1 , we obtain

$$\frac{dO_2}{d\bar{O}_1} = C'_{21} + C'_{22} \frac{dO_2}{d\bar{O}_1} + I'_{21} + I'_{22} \frac{dO_2}{d\bar{O}_1} - M'_2 \frac{dO_2}{d\bar{O}_1}.$$

Hence

$$\frac{dO_2}{d\bar{O}_1} = \frac{C'_{21} + I'_{21}}{1 - C'_{22} - I'_{22} + M'_2}.$$

The numerator $(C'_{21} + I'_{21})$ means something which should be called "marginal propensity of farm families to spend on non-agricultural products", and it will fall actually between unity and zero. The denominator $(1 - C'_{22} - I'_{22} + M'_2)$ will fall actually also between unity and zero, so that $1/(1 - C'_{22} - I'_{22} + M'_2)$ will be more than unity. If we set $C'_{21} + I'_{21} = E'$ and $1/(1 - C'_{22} - I'_{22} + M'_2) = \theta$, we see

$$1 > C'_{21} + I'_{21} = E' > 0$$

$$\frac{1}{1 - C'_{22} - I'_{22} + M'_2} = \theta > 1.$$

Then we find at once

$$(11) \quad \frac{dO_2}{d\bar{O}_1} = \theta E' > E' > 0.$$

The implication of (11) will be expressed as follows. Under the condition of fixed agricultural prices a rise in agricultural output means the same amount of increase in farm family income, and consequently the expenditure, or the effective demand, of farm families on non-agricultural products will be raised by E' times (where $1 > E' > 0$) the increase in farm family income. Then through the multiplier effect, the rise in the effective demand will finally reach $\theta E'$ times the initial increase in \bar{O}_1 , or the increase in Y_1 . Thus we can say that one of the consequences of our analysis is: So far as price control is practiced with regard to agricultural products, a good crop, or more exactly, an increase in agricultural output, is one of the stimulating factor for the non-agricultural sector.⁷ Therefore, if a good crop takes place when non-agricultural production has already reached its ceiling because of some other influences, then it causes necessarily some inflation, unless some appropriate counter-measure is taken.⁸ On the contrary, good crop in depression will be desirable in any sense. It will serve to increase employment in non-agricultural sector.

In connection with $dO_2/d\bar{O}_1$,

$$\lim_{d\bar{O}_1 \rightarrow 0} \frac{\Delta O_2 / \Delta \bar{O}_1}{O_2 / \bar{O}_1} \equiv \frac{dO_2}{d\bar{O}_1} \frac{\bar{O}_1}{O_2}$$

means the ratio of the rate of change in effective demand for non-agricultural products to the rate of change in agricultural output. Of course this ratio depends highly upon the ratio \bar{O}_1/O_2 , or $\bar{O}_1/(\bar{O}_1+O_2)$.⁹

⁷ It is well to point out that we are concerned here with changes in agricultural output from one year to another. Thus, a good crop over two or more consecutive years does not mean a stimulating factor. On the other hand, a normal crop after a bad crop will raise the effective demand for non-agricultural products. Therefore, by a good (or bad) crop we mean in this paper a yield increase over (or decrease from) the preceding year.

⁸ I think, one of the causes why the boom went too far in Japan in 1956 and 1957 was the record-breaking good crop in 1955, though this might be a less significant cause.

⁹ There are many under-developed countries in which the ratios \bar{O}_1/O_2 are more than unity. But at the same time in those countries the marginal propensities of farm family to spend on non-agricultural products, E' , will be considerably less than those in advanced countries. However, on balance, $\frac{dO_2}{d\bar{O}_1} \frac{\bar{O}_1}{O_2}$ in under-developed countries will be larger than those in advanced countries. At any rate, it is safe to say, the larger is the weight of agriculture in the economy, the more significant will be the influences of yield fluctuation on either the non-agricultural sector or the total economy, *ceteris paribus*.

Now let us turn to the effects of a change in \bar{O}_1 on the other quantities. From (3), (4), (1) and (2) respectively we obtain

$$(12) \quad \frac{dY_1}{d\bar{O}_1} = 1$$

$$(13) \quad \frac{dY_2}{d\bar{O}_1} = \frac{dO_2}{d\bar{O}_1} \quad (>0)$$

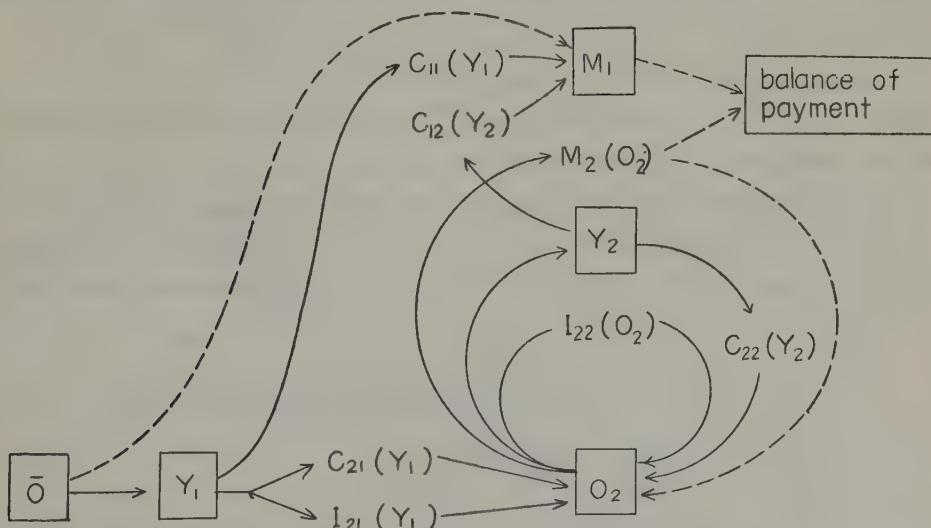
$$(14) \quad \frac{dM_1}{d\bar{O}_1} = -1 + C'_{11} + C'_{12} \frac{dO_2}{d\bar{O}_1}$$

$$(15) \quad \frac{d}{d\bar{O}_1} \{M_2(O_2)\} = M'_2 \frac{dO_2}{d\bar{O}_1} \quad (>0)$$

Hence

$$(16) \quad \frac{d}{d\bar{O}_1} \{M_1 + M_2(O_2)\} = -1 + C'_{11} + (C'_{12} + M'_2) \frac{dO_2}{d\bar{O}_1}.$$

Nothing can be said *a priori* about the signs of (14) and (16), but actually they will be negative, since C'_{11} , C'_{12} and M'_2 are sufficiently small and also $dO_2/d\bar{O}_1$ will be not so large. Thus it is fairly certain that a good crop has, on balance, an import decreasing effect.¹⁰ However,



¹⁰ In (16) both M_1 and M_2 represent the amounts of imports valued at domestic prices. Then, in cases where there are differences between domestic and import prices, some slight modification is needed in order to find out the change in the amount of imports valued at import prices. In 1955, in Japan the ratios of import prices to domestic prices for rice, wheat, barley and soybean were, respectively, 0.66, 0.71, 0.67 and 0.68; and the weighted average of these ratios was 0.68.

we must not leave unnoticed that a good crop contains the necessary effect of increasing the imports of non-agricultural products under the price controlling policy. Good crop will make the balance of payments better off by decreasing import, but it will do so only so far as its import decreasing effect exceeds its import increasing effect. This is second consequence of our analysis.

The above figure aims to show the economic effects of a yield change. The solid lines represents positive effects and the dotted lines negative effects.

VI

Hitherto we have assumed that both \bar{A}_{12} , inputs of agricultural products into the non-agricultural sector, and \bar{Q} , off-farm income of farm families earned in the non-agricultural sector, are constant. As a second approximation, we shall consider both of them as functions of non-agricultural output O_2 and substitute $A_{12}(O_2)$ and $Q(O_2)$ respectively for \bar{A}_{12} and \bar{Q} in (1), (3) and (4). Then the stability condition of the non-agricultural market is represented by the following expression :

$$(10') \quad 1 - (1 - A'_{12} - Q')C'_{22} - I'_{22} + M'_2 - (C'_{21} + I'_{21})Q' > 0,$$

in stead of (10), i.e. $1 - C'_{22} - I'_{22} + M'_2 > 0$. It will be reasonable to suppose that the condition (10') holds actually.

Then differentiating the simultaneous equations (2), (3) and (4) (in which $A_{12}(O_2)$ and $Q(O_2)$ have been substituted respectively for \bar{A}_{12} and \bar{Q}) with respect to \bar{O}_1 , and solving the resulting simultaneous equations, we obtain

$$(11') \quad \frac{dO_2}{d\bar{O}_1} = \frac{E'}{1 - (1 - A'_{12} - Q')C'_{22} - I'_{22} + M'_2 - (C'_{21} + I'_{21})Q'} \quad (> 0)$$

$$(12') \quad \frac{dY_1}{d\bar{O}_1} = 1 + Q' \frac{dO_2}{d\bar{O}_1} \quad (> 0)$$

$$(13') \quad \frac{dY_2}{d\bar{O}_1} = (1 - A'_{12} - Q') \frac{dO_2}{d\bar{O}_1}.$$

$dY_2/d\bar{O}_1$ must be positive, because both A'_{12} and Q' are input coefficients of non-agricultural production and therefore $(A'_{12} + Q')$ must be less than unity.

Furthermore we have

$$(14') \quad \frac{dM_1}{d\bar{O}_1} = A'_{12} \frac{dO_2}{d\bar{O}_1} + C'_{11} \frac{dY_1}{d\bar{O}_1} + C'_{12} \frac{dY_2}{d\bar{O}_1} - 1$$

$$(15') \quad \frac{d}{d\bar{O}_1} \{M_2(O_2)\} = M'_2 \frac{dO_2}{d\bar{O}_1} \quad (> 0)$$

$$(16') \quad \frac{d}{d\bar{O}_1} \{M_1 + M_2(O_2)\} = -1 + C'_{11} \frac{dY_1}{d\bar{O}_1} + C'_{12} \frac{dY_2}{d\bar{O}_1} + (A'_{12} + M'_2) \frac{dO_2}{d\bar{O}_1}.$$

Comparing (11')–(16') with (11)–(16) we can see that assuming both A_{12} and Q as functions of O_2 does not change the signs of $dO_2/d\bar{O}_1$, $dY_1/d\bar{O}_1$, $dY_2/d\bar{O}_1$ and $dM_2/d\bar{O}_1$. On the other hand, those of $dM_1/d\bar{O}_1$ and $\{M_1 + M_2(O_2)\}/d\bar{O}_1$ may, but probably will not, be changed by the assuming. Therefore, hereafter we will again adopt for simplicity the initial assumption that both A_{12} and Q are constant.

VII

In the preceding two sections we have considered several effects of a change in agricultural output \bar{O}_1 . Now let us turn to an analysis of the effects of a change in *government investment* \bar{I} , in order to derive a suggestion on some appropriate policy measure against undesirable consequences of yield fluctuation, if needed.

Differentiating the equation, which is obtained by substituting (3) and (4) for Y_1 and Y_2 in (2), with respect to \bar{I} , and solving the resulting equation for $dO_2/d\bar{I}$, we obtain

$$(17) \quad \frac{dO_2}{d\bar{I}} = \frac{1}{1 - C'_{22} - I'_{22} + M'_2} = \theta \quad (> 1).$$

Then from (11) and (17) we see at once

$$(18) \quad \frac{dO_2}{d\bar{O}_1} = E' \frac{dO_2}{d\bar{I}}.$$

This means that the effect of an increase in agricultural output \bar{O}_1 on the effective demand for non-agricultural products is E' times (where $1 > E' > 0$) the effect of the same increase in value in government investment \bar{I} on the effective demand. Therefore, the effect of a decrease in \bar{O}_1 owing to a bad crop on the effective demand will be just offset by

a E' -fold increase in \bar{I} . This is the third consequence of our analysis.

However, we must not neglect the side effect of such an effective demand stabilizing policy on the external balance of payments. From (3) and (4) we see

$$(19) \quad \frac{dY_1}{d\bar{I}} = 0$$

$$(20) \quad \frac{dY_2}{d\bar{I}} = \frac{dO_2}{d\bar{I}} \quad (> 1).$$

Then from (1) we derive

$$(21) \quad \frac{dM_1}{d\bar{I}} = C'_{12} \frac{dO_2}{d\bar{I}} \quad (> 0).$$

Of course,

$$(22) \quad \frac{d}{d\bar{I}} \{M_2(O_2)\} = M'_2 \frac{dO_2}{d\bar{I}} \quad (> 0).$$

Hence

$$(23) \quad \frac{d}{d\bar{I}} \{M_1 + M_2(O_2)\} = (C'_{12} + M'_2) \frac{dO_2}{d\bar{I}} \quad (> 0).$$

Now let us suppose that a bad crop has taken place and government investment has been increased by E' times the decrease in agricultural output, so as to just offset the decline of the effective demand for non-agricultural products. What will happen to imports? From (23) and (16) we derive

$$\begin{aligned} (24) \quad & E' \frac{d}{d\bar{I}} \{M_1 + M_2(O_2)\} - \frac{d}{d\bar{O}_1} \{M_1 + M_2(O_2)\} \\ &= E'(C'_{12} + M'_2) \frac{dO_2}{d\bar{I}} - \left\{ -1 + C'_{11} + (C'_{12} + M'_2) \frac{dO_2}{d\bar{O}_1} \right\} \\ &= 1 - C'_{11} \\ & \quad \left(\text{since (18)} \ E' \frac{dO_2}{d\bar{I}} = \frac{dO_2}{d\bar{O}_1} \right). \end{aligned}$$

Taking into account that C'_{11} is actually much less than unity, the sign of (24) must be positive. Thus we can say as follows: The increase of imports owing to a bad crop will be reinforced by the increase caused by a rise in government investment for the purpose of stabilizing the

effective demand. In the above case the total increase of imports will amount to $(1 - C'_{11})$ times (where $1 > 1 - C'_{11} > 0$) the decrease in agricultural output.

We may conceive of an opposite situation in which a policy to control government investment is undertaken so as to stabilize the total imports irrespective of good or bad crop. Even in the case of a bad crop, total imports may be kept unchanged, if the government investment is reduced so as to offset the increase in imports due to the bad crop. However, it is obvious that by such a policy the effective demand for non-agricultural products is reduced more. Thus, in so far as policies in connection with yield fluctuation is concerned, the policy of controlling government investment for stabilizing the effective demand and that for stabilizing external balance of payments are necessarily incompatible with each other. This is the fourth consequence of our analysis. Which of these two policies should be better will depend mainly upon the situation which the country concerned faces. As for Japanese economy it will be more significant to stabilize the effective demand.

VIII

Hitherto we have considered the effects of yield fluctuation owing to the change of climatic conditions, or more generally, of yield change with constant inputs. However, by a slight modification our analysis may be applicable also to the effects of yield change owing to a rise in inputs. If we can find out the net increase in farm family income due to the rise in inputs, then the analysis can be carried out exactly in the same way as be done in the preceding pages.

In Japan there has been a tendency for the ratio of agricultural income to national income to decline rapidly for past several decades. Also, a new tendency for the fluctuation of agricultural production to become smaller seems to have begun since about 1956, mainly owing to technical progress. Therefore, it is reasonable to suppose that the problem treated in this paper will continue to decline in significance. Quite likely it will lose most of its significance in the not too remote future in so far as Japan is concerned. However, I think it will be capable of

great influences, as presented in this paper, upon the economies of under-developed countries for many years to come, provided these countries adopt the policies to stabilize agricultural prices.

Lastly, in a economy which has no price controlling system, yield fluctuation will strongly affect agricultural prices. The economic effects of a yield change under such a situation may be successfully treated by a method which may be called "two sector income and price analysis".

(January, 1960)

GROWTH OF SECURITIES MARKET IN FEUDAL JAPAN

YŌTARŌ SAKUDŌ

PREFACE

It is necessary to date back to the age before the third year of Jōō (1654) to consider the formation and growth of the securities market in Feudal Japan¹⁾. A public notice sent out in that year by the Ōsaka Magistrate's Office, an agency of the Shogunate, provides us with a record that rice-brokers set about buying and selling rice by means of certificates or warehouse receipts known as rice drafts (*kome-tegata*), or rice cheques (*kome-gitte*), a few years prior to that year. From this fact it may be judged that the issue of securities or negotiable papers for stored rice took place earlier than 1654. The same notice states that rice drafts were issued for trading in futures as well. This leads us to surmise that in bill transactions future business without spot rice was raising its head as well as spot trading chiefly in rice²⁾. The Shogunate authorities, who had been persisting the prohibition of spot dealings in rice on balancing accounts, gave official sanction for future business in the 15th year of Kyōhō (1730), utterly changing their policy. Thus dealings in rice on balancing accounts came to be wide-open at Dōjima in Ōsaka.

As stated above, in Japan, the securities market came into existence as early as in the seventeenth century, and speculative dealings were also officially sanctured in the first half of the eighteenth century. This may be regarded as note-worthy in the world history. The first stock exchange established in Europe and America was that of Frankfurt, but it was in

¹ *Public Notices and Verbal Notifications—History of Ōsaka*, Vol. III, 1927, p. 47; Shigetomo Kōda, *History of Japanese Economy*, Art. 'Rice Drafts,' 1929, pp. 11-12.

² *Public Notices and Verbal Notifications—History of Ōsaka*, 1927, Vol. III, p. 284.

1867, more than one century later than in Japan. As to the New York Stock Exchange, it was established still later in 1892. The New York Cotton Exchange, which was established in 1871, opened its stock business in 1915. It was not until 1925 that the Chicago Grain Exchange established in 1848 adopted its liquidation system³⁾. All these facts enable us to affirm that commercial technics in Japan made a unique growth having no equal in the world history.

This article is intended to describe the origin of the securities market by citing the case of Ōsaka which was the center of the securities market formation in Japan (Cap. 1), explain about the processes of its development (Cap. 2), classify the various types of securities or rice drafts transacted on the market (Cap. 3), take up the substance of securities (Cap. 4), and lastly refer to the vicissitudes securities transaction have undergone (Cap. 5). It is also intended to find out a standard to draw a sharp line between the drafts in the early modern times represented by the rice drafts and drafts or paper money generally known as currency.

I. MOTIVE FOR GROWTH OF SECURITIES MARKET

The organization of the feudal government and its clans founded on an economic policy of operating the rice market made it a principle to levy taxes upon their fiefs in rice, and both the Shogunate and the clan authorities were naturally obliged to sell at market the surplus of the collected rice for cash. Consequently Ōsaka, known as the center of important traffic routes, with the highly-developed provinces on the coast of the Seto Inland Sea, rapidly grew into the central market for rice and other products from those provinces⁴⁾. The *Bakufu* established its rice granaries in Ōsaka, while warehouse-residences (*Kura-yashiki*) to store and sell rice and other commodities were set up there by feudal

³ Tokuichi Shimamoto, *Study on the Securities Market in the Tokugawa Period*, Preface, 1953, pp. 2-3.

⁴ A. F. Thomas and Soji Koyama, *Commercial History of Japan*, 1936, pp. 142-143; Mataji Miyamoto, *The Merchants of Ōsaka*, *Ōsaka Economic Papers*, 1958, Vol. VII. No. 14.

lords (*Daimyo*), the other feudal lords receiving an annual stipend of less than 10,000 *koku* of rice (*Kotaiyoriai*), retainers of the *Shogun*, and temple and shrine authorities as well. It is said that the rice annually forwarded to Ōsaka amounted to about three-million *koku*, and this means that 10 per cent of the nation-wide yield of rice, which was estimated at thirty-million *koku* in those days, was sold for cash in Ōsaka. Besides rice, among the goods shipped to the *Kura-yashiki* in Ōsaka were indigo from Awa clan, matting from Fukuyama clan, sugar from Sanuki clan, paper from Tosa and Nagato clans, cotton from Harima, Bizen and Suhō clans, leather from Himeji clan, wax from Chikugo clan, and so forth. But it goes without saying that the most important commodity was rice. And the rice thus stocked in the *Kura-yashiki* was put on the market by the managers of warehouse commodities (*Kura-moto*) and it was transacted by means of the stored rice cheques. The growth of the securities market in Ōsaka was closely related to the geographical and economic situations as stated above. Moreover, it is essential to research after the political conditions in connection with the commercial policy taken by the Shogunate authorities.

The *Bakufu* not only took measures for developing Ōsaka, which had been patronized by Hideyoshi Toyotomi, and helping its merchants, but also drove forward a policy of administering their business. In other words, the *Bakufu* granted the merchants of Ōsaka a privilege to organize *Kabu-nakama* (bodies of merchants known as guilds in this period) for the purpose of securing order and system in the commercial transactions, while the *Bakufu* tried to let them act in its behalf in promoting the commercial policy. Mighty support by the *Kabu-nakama* in Ōsaka was required to carry into effect such as coinage, price regulation and control of the rice market, etc. In the transaction of rice, the *Bakufu* made the spot trading its principle, prohibited the resale of the rice cheque, and enforced a policy to halt the development of the securities market. However, such were the financial influence of rice-brokers who were coming to the front, prosperity in securities transaction, and nation-wide

economic development that the *Bakufu* was obliged to authorize rice transaction on accounts at last in the 15th year of Kyōhō (1730), which was followed by the rapid development of the securities market. In those days rice transacting on accounts was opposed by thinkers and political economists, as well as the *Bakufu* authorities, who all regarded the transaction as akin to gambling⁵⁾, but the conversion of the policy in the 15th year of Kyōhō (1730) may be called opportune measures taken by the *Bakufu* authorities.

II. DEVELOPMENT OF SECURITIES MARKET

The rice cheques issued by the *Kura-yashiki* in Ōsaka, which had been at first mere rice warrants or warehouse certificates, came to have a nature of valuable securities, and as the negotiability of the securities was becoming definite, the securities market was brought to existence. Spot transaction in rice was, as well known, done on the banks of the Yodo, especially of the Tosabori, its branch stream, mainly because of the convenience in transportation and storage, and in the early period the transaction went on in the street of Kitahama which was the base for rice-brokers including the famous millionaire merchant Yodoya, the richest person in Ōsaka at that time. But in the 10th year of Genroku (1697) when part of Dōjima, a delta on the Yodo, was newly laid out, the market was removed there to avoid traffic obstructions on the street of Kitahama and foster the newly opened Dōjima.

The *Bakufu* authorities prohibited the resale of rice cheques to check a rise in the price of rice caused by it, and in the 3rd year of Kambun (1663) they controlled the circulation of rice cheques by cutting down the term of thirty days for opening rice granaries for sale to ten days to reduce the price of rice. But buyers paid off the price within the ten days, and they still had rice kept in warehouses (*Kura-yashiki*) and resold

⁵⁾ Zensaku Sano, *Study on the Speculative Market*, 1914, Vol. I, p. 26.

the rice cheques. While the *Kura-yashiki* issued rice cheques without security of rice in stock from the wide difference in amount between the issue of rice cheques and the demand of negotiation, the latter being less than the former. This endowed the rice cheques with the virtue of negotiable papers, and made it difficult for the *Bakufu* to attain the policy for the regulation of rice prices. The *Bakufu*, therefore, tried to control the prices of rice by authorizing the establishment of the rice market called *Ōsaka-komeza-okawase-goyōkaisho* at Dōjima-Shinzaike⁶⁾ under the supervision of three merchants, Sanemon Mitani, Kuranosuke Nakajima and Hikoroku Fuyuki. This market made it a principle to transact rice in stock by means of rice cheques, but it did future delivery as well and could not succeed in regulating the rice market, until it was closed up by order of the *Bakufu* in the 7th year of Kyōhō (1722). However, later in December of the 10th year of Kyōhō (1725) the *Bakufu*, driven by the necessity of the rice price regulation policy, authorized the establishment of the new rice market named *Ōsaka-okawasemai-goyōkaisho* under the management of three Edo merchants, Gembei Kinokuniya, Riemon Ōsakaya and Jimbei Nomuraya⁷⁾. This market was to transact only rice in stock as the former one, but future delivery or speculative trading also went on outside the office. This new market, however, did no thriving business, and it became discontinued only one year later, in December of the 11th year of Kyōhō (1726), and the business was succeeded by the governmental rice market at Dōjima-Eiraichō which is described next. In March of the 12th year of Kyōhō (1727), Seizaburo Nakagawa, Shigeemon Kawaguchi and Magobei Kubota, all Edo merchants, were granted a permit to establish the governmental rice market⁸⁾ and opened for business on the premises of Shōjirō Shioya at Eiraichō. Most of rice-brokers in Ōsaka laid complaints before the Magistrate's Office against the governmental rice market when it was established, and at

⁶⁻¹⁰ Katsushige Kotani, *History of Regulations of Japanese Exchanges*, 1953, pp. 101, 105, 106, 110, 111.

the same time claimed the complete authorization of future transactions. In June of the 13th year of Kyōhō (1728) when the governmental rice market was founded, 604 rice-brokers sent by agreement five representatives to the Shogunate—Gihei Kawachiya, Kyūemon Fukushimaya, Tōemon Tanabeya, Zenemon Sakaiya and Seibei Kajimaya—to call for the discontinuance of the governmental rice market and the authorization of future transactions. Meanwhile the attainment of their demands seemed difficult, but in December of the 13th year of Kyōhō (1728) the *Eiraichō-kaisho* went out of existence at the final decision announced by Echizen-nokami Ōoka, an Edo Magistrate. But the question of the authorization of future transactions was not taken up at all. It is thought that the magistrate, who considered it fit for the situation to connive for a time at the commercial custom of future transactions which had been in practice irrationally, made no reference to this point. In May of the 14th year of Kyōhō (1729), the *Bakufu* granted permission for the foundation of the Fuyuki Rice Market at Kitahama under the joint management of five merchants of Edo, Zentarō Fuyuki, Magobei Sugita, Manemon Iseya, Heishirō Tochiki and Hikoroku Fuyuki⁹. Thus an authorized rice market was established at the shop of Heisuke Tennōjiya, Kitahama 1-chōme, and all dealings in rice at other places were prohibited. The control and administration of the Ōsaka rice market left in the hands of the merchants of Edo successively was, of course, of great significance, it might be said, not in point of their superiority to the merchants of Ōsaka or oppression upon them, but in point of the situation of the merchants of Edo as proxy for the *Bakufu* in executing its policy of regulating rice prices and consequently their advance into Ōsaka. The *Bakufu*, therefore, granted the authorized market permission for transacting only rice in stock, while it kept on the policy of prohibiting future transactions and tried to suppress the speculative transaction among rice-brokers in Ōsaka. This caused the rice-brokers to start a movement for the discontinuance of the governmental rice market and the authorization of future transactions. It may be interpreted that such a movement was not a question between the merchants of Edo and Ōsaka only but that it was substantially opposition between the *Bakufu's* regulating

policy and Ōsaka business methods. Now, the authorization of the Fuyuki Rice Market thoroughly smashed the intention of the Ōsaka rice-brokers, but their representatives consisting of three merchants, Tanabeya and Kajimaya, mentioned above, and Tōbei Amagasakiya, newly elected, rose against the existence of the rice market and the prohibition of future transactions. Though it was not easy to realize their desires, the discontinuance of the Fuyuki Rice Market and rice transaction on accounts, or speculative business, at the Ōsaka market were finally decided on after the trial by Echizennokami Ōoka. This resulted in the growth of the Dōjima Speculative Rice Market¹⁰⁾ in August of the 15th year of Kyōhō (1730), and transaction on credit showing the most advanced form of securities transaction came into existence. Generally speaking, the authorization of speculative rice transaction in the Kyōhō period, together with the nation-wide production and circulation of goods and the development of monetary economy and the general growth of credit money could be regarded as epoch-making¹¹⁾.

III. TYPES OF SECURITIES

The rice cheque treated as securities was made of hard kinds of paper such as 'nishinouchi' and 'senka', and had the number of rice bales specified in the first place on the surface. It had also the account stated to the effect that rice of due amount was to be delivered in exchange for it, and the name of the granary generally known as warehouse-residences. And a piece of cheque stood for ten *koku* of rice.¹²⁾ The cheques were divided into two kinds—negotiable cheque and promissory cheque.¹³⁾ The negotiable cheque had another name 'rice delivery

¹¹ The general growth of the credit money in the early modern age and that of categories of bad coins in the same period—paper money issued by clans and private paper money, both placed in circulation as credit money have been studied and discussed before by the writer of this article. It would be desirable to take the authorization of speculative rice transaction in the Kyōhō period for one of the most important stages in the development of transaction on credit. Refer to the writer's 'Currency in Japanese Feudal Society', 1958, p. 134.

¹² Mataji Miyamoto, *The Merchants of Ōsaka*, 1957, p. 211.

¹³ Tōhaku, *History of Development of Rice Market* (issued in the 5th year of Enkyō)—*Popular Economic Library*, Vol. I, pp. 236-7.

cheque' and it was issued, as a rule, in the case when warehouse rice was to be had, while the promissory cheque, which had some other names such as 'supply cheque', 'blank cheque', 'future cheque', and 'excess cheque', was for the rice to arrive in future. In other words, the former had guarantee of rice delivery and the latter had no such guarantee. Moreover, there were two types in the latter—the market promissory cheque and the secret promissory cheque¹⁴⁾—according to the kinds of creditors. This was literally a draft which was secretly given to a creditor together with a bond of debt as security for obligation and evidently possessed a function of the 'supply cheque'; that was a draft of the same form with the rice delivery cheque which was issued in case where the creditor was an influential dealer in rice or a person concerned with the Dōjima Rice Market. It is said that in April of the 2nd year of Kanen (1749) only about 30,000 bales of rice were secured against 110,000 bales, the total amount of the rice mentioned on the cheques issued, which means that the amount of the rice mentioned on the issued cheques was about 3.7 times as much as that of the rice in stock,¹⁵⁾ and that the amount of the rice issued in future cheques was 80,000 bales or 32,000 *koku* of rice in excess of that of the rice in stock. Furthermore, in June of the 3rd year of Kansei (1791) future rice cheques for 28,000 *koku* had been issued by the Kurume clan in Chikugo Province, and in the 11th year of Bunka (1814) 420,000 *koku* and 200,000 *koku* respectively by the Kurume clan and the Saga clan in Hizen Province. These measures naturally raised controversies. Future rice cheques were issued in such a vast amount in the name of future cheques or security cheques in connection with financial straits of clans, and these cheques were treated as a kind of clan loan. The historical materials still preserved by the family of Kōnoike, an exchange-broker, reveal how feudal lords used to issue rice cheques as security for their loans, delivering to their creditor, Kōnoike, rice cheques

¹⁴ Tokuichi Shimamoto, *Study on the Securities Market in the Tokugawa Period*, 1953, op. cit., pp. 14-17.

¹⁵ *Rice Price Table*—article of Apr. 7, 2nd year of Kanen.

together with bonds.¹⁶⁾ By the management of rice cheques feudal lords contrived to borrow money of exchange-brokers, and the function of exchange-brokers made the circulation of goods and currency expand to excess and brought about the growth of spurious funds.¹⁷⁾

Among the drafts similar to the rice cheques in Ōsaka were rice cheques and rice paper issued by clans. Rice cheques issued by a clan were used when stored rice was sold within the clan, and though their scale varied large or small, they were almost of the same nature as the rice delivery cheques in the Ōsaka market. As for the rice paper, it was, conversely, a kind of paper money, and it had to be kept distinct from general rice cheques. For instance, in case of the Kurume clan in Chikugo, though rice papers were issued once in the 4th year of Temmei (1784) for the purpose of regulating the rice prices within the clan,¹⁸⁾ they were quite the same in substance with the general paper money which included notes issued by clans or by individuals against gold, silver and copper. Generally speaking, therefore, a sharp line should be drawn between a draft or rice cheque and paper money or rice paper.

IV. BASIC NATURE OF SECURITIES

The Dōjima Rice Market used to do business chiefly in rice cheques, while speculative dealings such as dealings in rice on balance accounts kept on developing outside of the main transaction. However, in observing the nature of securities viewing the Dōjima Rice Market as one of the

¹⁶⁾ Materials related to future rice cheques reserved by the family of Kōnoike, such as Odawara-gura (warehouse-residence of Odawara), Akashi-gura, Himeji-gura, Izumo-gura, Iwakuni-gura, Kanaya-gura (or Hamada-gura), Bingo-gura (or Fukuyama-gura), Oka-gura, Nobeoka-gura, Chikugo-gura and Uwajima-gura will reveal the contrivances to promote the issue and circulation of future rice cheques.

¹⁷⁾ Yōtarō Sakudō, Some Aspects of the 'interest-bearing capital' in Tokugawa Period—Case of the Capital of Exchange-broker Kōnoike, *Economic Papers in Memory of the 10th Anniversary of the Economic Department of Ōsaka University, 1959.*

¹⁸⁾ Yōtarō Sakudō, The History of the Issue of Paper Money at the Kurume Clan, *Journal of Political Economy* (Economic Society of Kyūshū University) Vol. XVII, No.2, 1951, pp. 56, 92, 98; *Materials for History of Fukuoka Prefecture*, Vol. VIII, 1937, p. 435.

typical example of securities market, it will be necessary to research after their fundamental nature focussing upon the normal transaction.

The warehouse cheque such as a rice cheque has been regarded as identical in nature with the warehouse certificate¹⁹⁾, but on the other hand there has appeared a view that the rice cheque, which was a warehouse certificate in its origin, came to be treated as securities, deprived of its nature as a warehouse certificate²⁰⁾. The former interpretation that the rice cheque was a warehouse warrant may be said to specify the nature of the rice cheque in the early period. While, according to the latter, the rice cheque, which possessed the nature of the warehouse certificate only for a short period, gradually partook of that of the promissory draft or the negotiable paper. As for the warehouse warrant, the goods mentioned in the warrant were not originally in the possession of the storage man, but they were only left in his custody; the bearer of the warrant specifying the name and location of the merchandise was the owner of the specified merchandise. In case of the rice cheque, however, great importance is attached to the fact that the rice mentioned in the cheque was not specified until the delivery of rice was done by request, and from the fact that the rice was not specified and the title to it was still in the hand of the warehouse keeper, the rice cheque is regarded not as a warehouse certificate but as a kind of promissory draft or a negotiable paper that promised the delivery of the rice in exchange for it²¹⁾. After all, the former shows the nature of the rice cheque in its early period, and the latter that in its early and later periods. In viewing the historical development of the rice draft and considering its changes in nature, the following three stages might be set up:—

The first stage: The rice cheque was called the rice draft at first. When a rice-broker purchased rice in stock at a rice market in this

¹⁹ Keitarō Iibuchi, *History of Credit System in Japan*, 1948, p. 71; Yōtarō Sakudō, *The History of the Issue of Paper Money at the Kurume Clan*, 1951, op. cit., p. 40.

²⁰⁻²¹ Tokuichi Shimamoto, *Study on the Securities Market in the Tokugawa Period*, 1953, op. cit., pp. 94-5.

period, about one-third of the price was paid as a deposit and a certificate or a rice draft was issued by the warehouse-residences. In such a case the rice against the certificate was secured at the outset, and evidently the rice draft had the effect of a warehouse receipt. This may be called the first stage—the stage in which no rice-broker was to be seen to resell a rice draft during the warehousing period of the rice.

The second stage: The custody certificate or warehouse certificate came to be treated as a negotiable paper, not as a mere certificate, and began to be resold and circulate at market. In other words, the rice draft acted as a negotiable paper in nature as well as a warehouse certificate. Hence it follows that the period of transaction with two opposite sides of the rice draft displayed may be asserted. According to the public notice announced by the Ōsaka Magistrate in the 3rd year of Jōō (1654), resale by means of certificates was commenced by rice-brokers in those days. This period may fall on the second stage.

The third stage: Lastly the third stage may be mentioned when the rice draft was gradually deprived of its nature as a warehouse certificate until it came to function rather as a negotiable paper. It may be said that the change of the name from 'rice draft' (*Kome-tegata*) to 'rice cheque' (*Kome-gitte*) shows the change of the nature of the rice certificate.²²⁾ The warehouse-residences had the rice in its keeping, receiving part of the price, but the rice in custody was received by few of the depositors within the thirty-day free custody period, which caused the warehouses always to keep a vast deal of rice in stock. This state of affairs might be compared to the relation between the amount of claim for conversion out of the currency in circulation and the reserve cash in case of the issue of paper money. At the warehouse-residences of each

²²⁾ According to the chronicle of Dōjima Rice Market the future transaction by the rice draft was prohibited by law in July of the 9th year of Kyōhō (1724), but the future transaction by the rice cheque was authorized in July of the 13th year of Kyōhō (1728). It may be concluded that in this period there took place an utter change in the function of the rice draft with the change of its name from rice draft to rice cheque. *Chronicle of Dōjima Rice Market—Series of Economics in the Early Modern Society*, 1926, Vol. II, pp. 10, 14.

clan, rice cheques were issued even for the future rice, and the sum of rice cheques issued in excess of the amount of rice in stock used to be recorded. It may be confirmed that the issue of rice cheques for the amount of rice about 3.7 times as much as that of the stored rice and the problem of future rice drafts of a vast sum, as stated above, resulted from these circumstances.

Thus the cheques of the stored rice kept on developing and changing, but originally they were not issued as currency at all. However, as stated above, the situation so far developed as to make it possible to borrow money of an exchange-broker on the security of the rice cheque and even make the right to get the rice cheque an article for pawning.²³⁾ The rice cheque also tended to have a large circle of circulation. But the rice cheque was different in nature from the credit money such as a draft and paper money. It was bought, sold and sometimes resold because of its right to claim for rice, but its circulation was limited within a specified circle, which clearly shows it was not of the same nature as the credit money. According to one view, it is taken seriously that the rice cheque was put in circulation in Edo as well as in Ōsaka,²⁴⁾

²³⁾ Mataji Miyamoto, *The Merchants of Ōsaka*, 1957, op. cit., pp. 210-212.

²⁴⁾ Shigetomo Kōda, *History of Culture in Ōsaka—Collection of Lectures in Memory of Great Ōsaka*, 1925, pp. 8-9. Dr. Kōda regards the circulation of the rice cheques as extensive by stating, "As for the circulation of the rice cheques, it was limited within the small area of Ōsaka. The rice cheques, according to an old public notice still reserved, were as available as silver and gold coins not only in Ōsaka but in other cities and provinces. In fact, an agency was established in Edo in the period of Temmei for the convenience of the purchase of the Ōsaka rice cheques of the smaller amount. The agency was called the Ōsaka Rice Cheque Ordering Agency. This mere fact reveals how widely the Ōsaka rice cheques were current." He considers that the rice cheques were current in Edo as well and just as available as the official currency. This view, too, which seems to have been popular and common later, may be said to contain a lot of subjects of discussion. The Ōsaka Rice Cheque Ordering Agency, which Dr. Kōda regards as the Edo center of the circulation of the Ōsaka rice cheques, was a mere agency receiving orders for rice cheques for the purpose of dealing in the rice at the Dōjima Market in Ōsaka. It is thought difficult to conclude that such rice cheques were as available as the official currency not only in Ōsaka but in Edo. The rice cheques, which was originally a warehouse certificate presenting the right to claim for the stored rice, only partook of the nature of securities in the general growth of the securities market; it was anything but currency at its outset. Therefore it will be necessary to make a clear distinction between the general currency and the rice cheque which was negotiable chiefly in rice brokerage only in the specified areas.

and according to another, great importance is attached to the fact that the circulation of the rice cheque covered Ōsaka, Nagoya, Kuwana, and the districts of Chūgoku and Shikoku.²⁵⁾ Though these views cannot be approved of as they are, how the negotiation and circulation of the rice cheques was gaining ground in the specified area covered by Ōsaka rice-brokers may be acknowledged from the Ōsaka Magistrate's public notice stating, "It is reported that a rice draft passing into ten different persons' hands one after another in a day has caused a rise in the price of rice."²⁶⁾

V. VICISSITUDES OF SECURITY TRANSACTIONS

The securities market established in the early stage of the Tokugawa Period came to be more systematized and promoted with the authorization of rice transaction on balance accounts in the 15th year of Kyōhō (1730). The rice transaction on balance accounts was opened every morning at eight, while the spot dealing in rice at ten, two hours later. And naturally the rice price in the account market had effect on that in the spot market, always taking the initiatives in pricing the rice. Moreover, people throughout the country participated in the rice transaction on accounts. Those who had common sense of causes of fluctuations of rice, such as droughts, blights, storms and floods, rice purchase ordinances, rice storage ordinances, recoinage, cornering and stock gunning, and were able to bear up the burden of the balance or losses, could afford to be participants, and so it served to level and stabilize the price of rice in stock. Furthermore, as the rice transaction on accounts was done in anticipation of future business, buying, for instance, was done when the rice price was low in the hope that the price would go up in future, while selling was tried when the price was high. The transaction thus going on seemed to control the fluctuations. In addition to the advantages of the speculative transaction like this, the rice transaction on accounts checked the monopoly of profits by cor-

²⁵ Tahichirō Tanaka, *Study on Exchanges in Japan*, 1910, p. 21.

²⁶ *Public Notices and Verbal Notifications—History of Ōsaka*, Vol. III, 1927, op. cit., p. 47.

nering, prevented undue speculations, and controlled the excessive fluctuations, aided by the so-called 'diversion system'.²⁷⁾ Diversion meant diverting the previous day's prices, and this was a special settling method in the rice transaction on accounts. In fixing the fuse price—closing a deal before the dying-down of an ignited fuse, in case when the transaction was not settled within the limited time, all contracts made on that day were to become invalid and the prices fixed on the preceeding day remained unchanged.²⁸⁾ This sort of rice transaction was not attended by the issue and circulation of securities,²⁹⁾ but the development of the transaction more animated the activities of the Dōjima Rice Market, and dealings in rice in stock became more prosperous. As a consequence the rice cheques came to be issued on the security of the rice before arrival or the rice expected to arrive in future outside of the rice in stock. Thus the spot transaction of rice laid strong foundation for the development of the rice transaction on accounts and afterwards on the contrary the authorized rice transaction on accounts lent impetus to the advance of the transaction of rice in stock and the brisk circulation of the rice cheques.

The *Bakufu*, intending to protect the circulation of the rice cheques, exempted them from the regulations at the barriers in August of the 2nd year of Meiwa (1765), securing dealings in the rice cheques.³⁰⁾ To further the policy the *Bakufu* decided to purchase dishonoured rice cheques with the official funds in February of the 2nd year of An'ei (1773); in case when the cheques were dishonoured the *Bakufu* purchased them upon request to the warehouses.³¹⁾ This policy taken by the *Bakufu* was of great help to stabilize the circulating power of the rice

²⁷⁾ As for the effects of the rice transaction on accounts, refer to Tokuichi Shimamoto, *Study on the Securities Market in the Tokugawa Period*, 1953, op. cit., pp. 104–107.

²⁸⁾ Tokuichi Shimamoto, *Study on the Securities Market in the Tokugawa Period*, 1953, op. cit., p. 42.

²⁹⁾ As for the types of the rice transaction on accounts, see Shōhei Susuki, *History of Dōjima Rice Market*, 1940, p. 106.

³⁰⁾ Shinzō Takayanagi & Ryōsuke Ishii, *Collection of the Public Notices in the Temmi Period*, 1936, pp. 833–834; Tahichirō Tanaka, *Study on Exchanges in Japan*, 1910, op. cit., p. 20.

^{31–32)} Shinzō Takayanagi & Ryōsuke Ishii, *Collection of the Public Notices in the Temmei Period*, 1936, op. cit., pp. 835–838.

cheques and maintain their value, but it resulted in the imposition of too great financial burden on the *Bakufu*, coming to discontinuance before long. In September of the 2nd year of Temmei (1782) the *Bakufu* nominated Nuinosuke Gotō to the rice cheque supervisor, making him meditate troubles respecting the rice cheques, and abandoned the policy of purchasing dishonoured rice cheques with the official funds.³²⁾ The new policy, which was not carried out successfully, either, because of the aggravated burden of the charge for undergoing the inspection, was held in abeyance in the 4th year of Temmei (1784). The *Bakufu* was steadfast to the principle of non-interference in troubles, yet in the transaction of rice cheques it took the measures mentioned above. Besides, the *Bakufu* authorities gave facilities in legal proceedings regarding rice cheques, and they received lawsuits for urgent matters related to rice cheques on any days other than the fixed days, giving priorities to them.³³⁾ These legal procedures may be note-worthy together with the so-called priority trial which was a prompt court proceeding taken for a case concerning rice drafts in Ōsaka.³⁴⁾

The policy of purchasing dishonoured rice cheques and the step of inspecting rice cheques under the supervision of Nuinosuke Gotō out of the *Bakufu*'s policies for protecting rice cheques were of great significance not only for the protection of rice cheques but for the prevention of the indiscriminate issue of rice cheques by the warehouses and the practice of the rice price regulating policy of the *Bakufu*. The situations display something common to the *Bakufu*'s policy intending to regulate the rice price by granting merchants of Edo the privilege to establish the Ōsaka Rice Market before the Kyōhō period, but in the situations are found the transition from the regulation by people to that by law. After that the dealings in rice in stock and the transaction on accounts went on

³²⁾ *Old History of Dōjima Rice Market—Series of Commerce in the Tokugawa Period*, Vol. II, 1913, p.97; *Chronicle of Dōjima Rice Market—Series of Economics in the Early Modern Society*, 1926, op. cit., Vol. II, p. 72.

³⁴⁾ Ryōsuke Ishii, *Ōsaka in History of Laws—Mataji Miyamoto & Ryōsuke Ishii, History of Culture of Ōsaka*, 1955, pp. 137-138.

until the reorganization of the exchange took place in the early part of the Meiji Era.

It is added here, to express gratitude, that in writing this article the writer owed much to the co-operation of Mr. Akitaka Ōmine.

CHANGES IN TAX STRUCTURE AND THE LEVEL OF NATIONAL INCOME¹⁾

SEI FUJITA

In explaining the effect of fiscal policy on national income by Keynesian models, many writers have assumed the fiscal system as consisting of only one tax, usually a lump-sum tax or a proportional income tax.²⁾ It is quite apparent that such methods have the merit of simplifying analysis. However, they cannot show the *qualitative* aspects of tax policy. One of these qualitative aspects is the main concern in this paper; we want to analyze here the effects of changes in tax structure on the level of real national income by using a model incorporating a somewhat more complicated tax system. The paper is divided into three parts. The first section is devoted to explaining our model, which includes the income taxes on labor and capital incomes as well as the general sales tax. In the next section, we derive two income tax multipliers from the model and, by way of comparing them, consider the effect of changes in income tax structure on national income. The last section deals with the structural adjustment involving changes in the relative weight of income versus sales tax yields and analyzes its effect on national income

¹⁾ I am indebted to Dr. A. M. Tang for helpful suggestions in the preparation of this paper.

²⁾ See, however, R. Turvey, "Some Notes on Multiplier Theory," *American Economic Review*, June, 1953, pp. 275-95. He included in his model both income and indirect taxes, but his consideration seems to be confined to the special case where consumers have a pure money illusion and private investment is autonomous.

In recent years, some writers compared the deflationary effects of income and outlay taxes, but their arguments were usually developed without using rigorous theoretical models. See R. Goode, "Anti-Inflationary Implications of Alternative Forms of Taxation," *American Economic Review*, May, 1952, pp. 147-60; A. Morag, "Deflationary Effects of Outlay and Income Taxes," *Journal of Political Economy*, June, 1959, pp. 266-74; R. A. Musgrave, *The Theory of Public Finance*, 1959, pp. 447-52.

by a similar method. Throughout this paper, our analysis will be confined to short-run effects.

I

Many sorts of models could be constructed for analyzing the qualitative aspects of tax policy. Selection among them depends partly upon the points to be emphasized by a writer. But it seems hardly possible to justify the exclusion of income taxes or indirect taxes, since these two kinds of taxes are the main sources of public revenue in most industrialized countries, and yet their effects on effective demand differ in several important points. In our model, indirect taxes will be represented by the general sales tax which is applied at the same rate to all consumer goods. As for income taxes, let us assume two tax rates, one for labor income and the other for capital income. By this division of income and income tax, we can pay due attention to the fact that laborers and profit income receivers may show different reactions in their expenditure plans to the same additional income tax burden. Assuming different tax rates for these two kinds of incomes might also be regarded as a rough way of taking into account the progressivity (or regressivity) of income taxation. As the average level of capital income is usually higher than that of labor income, setting a higher tax rate for capital income would endow the income tax structure with a kind of progressive character.

Every argument concerning the effect of taxation on national income ought to start from some hypotheses on the shifting of tax burdens based on the theory of price determination. Suppose an economy where monopolistic competition prevails, and assume in the interest of simplicity that each firm's output is produced by combining variable amount of labor with fixed equipments and that the labor supply is perfectly elastic at a given level of money wage before tax. Then the net profit of a firm producing a consumer good can be shown by the following expression:

$$\pi = (1-t_p)[p(1-t_s)x - wn - f], \quad (1.1)$$

where π =net profit (profit after income tax), t_p =rate of the proportional income tax on profit, t_s =rate of the general sales tax (calculated on the price including tax), w =given wage rate, p =market price of the product, x =output, n =labor input and f =fixed costs. The maximization of net profit yields the optimum condition

$$(1-t_s)p\left(1-\frac{1}{e}\right)\frac{dx}{dn} = w, \quad (1.2)$$

where e is the price elasticity of demand for the product. As for the firms producing investment goods, we should, of course, put $t_s=0$ in the above formula. By analogy, let us suppose that similar optimum conditions are also applicable to the consumer and investment goods industries. We have then

$$(1-t_s)P_c\left(1-\frac{1}{E_c}\right)\frac{dX_c}{dN_c} = w \quad (1.3)$$

and

$$P_I\left(1-\frac{1}{E_I}\right)\frac{dX_I}{dN_I} = w. \quad (1.4)$$

In these expressions, P_c and P_I denote the price levels of consumer and investment goods respectively, E_c and E_I the elasticities of demand for two kinds of goods, N_c and N_I the employments in consumer and investment goods industries, and X_c and X_I the outputs of respective industries.

As shown by the above formulas, (1.3) and (1.4), the price level of consumer goods excluding the general sales tax, $(1-t_s)P_c$, and the price level of investment goods, P_I , depend upon the elasticities of demand and marginal productivities of labor in respective industries as well as the level of money wage. So long as all of these factors are assumed to

be stable, it follows that both $(1-t_s)P_C$ and P_I would not be affected by a change in demand condition. This assumption simplifies arguments very much, and it would not have any serious defect if there is no considerable bottleneck in labor or capital. So, let us confine our analysis to such a situation and accept the assumption.

Our hypotheses lead us to the following conclusions on the effects of taxation : (1) The income taxes for laborers or capitalists affect neither market price levels nor money wage rate. (2) The general sales tax always induces a rise of the market price level of consumer goods just enough for keeping their price level excluding the tax constant, but it does not affect the price level of investment goods nor money wage rate. These results are obvious if we look at formulas (1.3) and (1.4). Though they have been drawn from many simplifying assumptions, some of which might be questionable to a certain degree even in the normal economic situation, we want to accept these clear-cut conclusions as the starting points of our analysis.

We are now prepared to build up the system of equations. Our system consists of the following twelve equations.

$$T_w = t_w Y_w \quad (1.5)$$

$$T_p = t_p Y_p \quad (1.6)$$

$$T_s = \frac{t_s}{1-t_s} C \quad (1.7)$$

$$T = T_w + T_p + T_s \quad (1.8)$$

$$Y_w = \alpha Y \quad (1.9)$$

$$Y_p = (1-\alpha)Y - D \quad (1.10)$$

$$C_w = c_w(1-t_s)(Y_w - T_w) + A_w \quad (1.11)$$

$$C_p = c_p(1-t_s)(Y_p - T_p) + A_p \quad (1.12)$$

$$C = C_w + C_p \quad (1.13)$$

$$I = h(Y_p - T_p) + B \quad (1.14)$$

$$G = \bar{G} \quad (1.15)$$

$$Y = C + I + G \quad (1.16)$$

First four equations relate to tax revenues. Equation (1.5) shows that the labor income tax revenue T_w is got by applying the labor income tax rate t_w to labor income Y_w . A similar relationship for capital income tax is shown in equation (1.6), where T_p is its revenue, t_p its rate, and Y_p its base, namely net profit income. The general sales tax revenue T_s would be equal to $t_s C^*$ if we denote total consumption at market price by C^* .¹⁾ However, it will be more convenient in our model to measure consumption at *stable* factor costs. If we denote total consumption at factor cost by C , $(1-t_s)C^* = C$. Thus, $T_s (= t_s C^*)$ is equal to $\frac{t_s}{1-t_s} C$ as shown in (1.7), where $\frac{t_s}{1-t_s}$ means the sales tax rate calculated on the price excluding the tax. Total tax revenue T is the sum of the above three tax revenues, T_w , T_p and T_s . This is shown in equation (1.8).

Next two equations show the distribution of national income. Equation (1.9) implies the assumption that labor income Y_w is a constant fraction α of gross national income Y . It seems that statistical evidences justify this assumption as a first approximation to reality except for severe inflation or depression.²⁾ The profit income after depreciation allowances, of course, equals net national income minus labor income. This relation

¹⁾ Recall that t_s was defined as the sales tax rate calculated on the price including the tax.

²⁾ If we put $\frac{dX_c}{dN_c} = \frac{X_c}{N_c}$ in (1.3), we can get the following expression :

$$\frac{wN_c}{(1-t_s)P_c X_c} = \left(1 - \frac{1}{E_c}\right).$$

Under our assumptions, the left side of this expression means labor's relative share in the gross value added in the consumer goods industry, and this ratio is clearly stable. A similar ratio in the investment goods industry is also stable. Thus, if there is no great difference in the 'labor's share ratio' between two industries, labor's share in GNP would be rather stable over a wide range of income level.

is shown in equation (1.10), where D is the capital depreciation allowances. In short-run analysis, D could be regarded as given.

As for consumption, we need two consumption functions corresponding to our division of national income. At the first stage of our analysis, let us take the most simple assumption that the real consumption of each income group is a linear function of its disposable real income. As already explained, the price level of consumer goods excluding sales tax as well as the price level of investment goods is regarded to be stable. But the market price level of consumer goods (including sales tax), P_C , of course, depends on the level of t_s : If we put the stable price level of consumer goods excluding the tax equal to 1, P_C is denoted by $\frac{1}{1-t_s}$. Using this for deflating disposable money incomes of two groups, we can get the consumption function of laborers, (1.11), and that of profit income receivers, (1.12). In these equations, C_w and C_p denote real consumptions (or consumptions at current factor cost which is assumed to be stable), c_w and c_p marginal propensities to consume disposable incomes, and A_w and A_p the constant terms in consumption functions. It would be quite natural to suppose that $1 > c_w > c_p > 0$, $A_w > 0$ and $A_p > 0$. Next equation (1.13) shows a simple definitional relationship indicating that total consumption C is equal to C_w plus C_p .

So long as the hypothesis underlying our consumption functions is retained, both income and sales taxes depress real consumption by reducing the disposable real incomes of consumers. We notice, however, an important difference between them in the process of reducing disposable real income; whereas income taxes reduce disposable real income by cutting disposable money income, the sales tax lowers real purchasing power of a given disposable money income by pushing up the market price level of consumer goods. Of course, in the effect on real consumption there might be other differences between income and sales taxes,

which will be taken into account in the later stage of analysis by modifying our consumption functions.

Let us turn to the investment function. Throughout, we suppose that the interest rate will be kept constant by appropriate monetary measures, and assume that the gross private investment is a linear function of the profit after income tax. This assumption is incorporated into equation (1.14), where I is the gross investment, h marginal propensity to invest, and B a constant term. Since the amount of retained profit depends upon the level of net profit, our formulation can be interpreted as based on the hypothesis that the level of investment is a function of the availability of internal funds.¹⁹⁾ But it can also be regarded as a profitability approach to investment theory, since the level of current net profit is often taken as a basis for estimating the net profitability of investment. As shown by (1.14), only profit income tax has direct influence upon investment. This is one of the points to be kept in mind.

Last two equations are obvious. (1.15) shows that the government expenditures for goods and services G are assumed constant. (1.16) represents the equilibrium condition for final goods market as a whole.

Now we have completed the model. From (1.5), (1.6), (1.9)~(1.13), we can derive total consumption function

$$C = (1-t_s)[c_w(1-t_w)\alpha Y + c_p(1-t_p)\{(1-\alpha)Y - D\}] + A, \quad (1.17)$$

where $A = A_w + A_p$. This equation, together with (1.14), (1.15), and (1.16), determines the equilibrium value of gross national income:

¹⁹⁾ The availability of internal funds also depends on the amount of current depreciation allowances. If we want to take this fact into account explicitly, our investment function should be changed to

$$I = h(Y_p - T_p + D) + B'.$$

However, so long as h and D are regarded as fixed, hD may be absorbed into the constant term. This interpretation is also applicable to the internal liquid funds accumulated in the past.

$$Y = \frac{A + B + \bar{G} - [c_p(1-t_s) + h](1-t_p)D}{1-E}. \quad (1.18)$$

In this expression, E denotes $c_w(1-t_s)(1-t_w)\alpha + [c_p(1-t_s) + h](1-t_p)(1-\alpha)$, which is the marginal propensity to spend gross national income. The numerator represents gross national expenditure when gross national income is zero. This could be regarded as positive. Therefore, economically meaningful solution exists only if E is less than one. Let us assume that this condition will be met. The assumption also assures the stability of our model. As easily seen from (1.18), the equilibrium level of Y depends on, among others, the values of tax policy parameters, t_w , t_p and t_s . These parameters, on the other hand, determine the total tax yield at a given income level. This can be shown by the expression

$$T = [t_w + c_w(1-t_w)t_s]\alpha Y + [t_p + c_p(1-t_p)t_s][(1-\alpha)Y - D] + \frac{t_s}{1-t_s}A \quad (1.19)$$

which is derived from (1.5)~(1.10) and (1.17). The above two expressions of Y and T will play important roles in the following analysis.

II

What is the effect of a change in tax structure on the level of national income? This is the question to which we must reply by using the above model. Before tackling this problem, we should say a few words about the meaning of *changes in tax structure*. Every tax system consists of a number of taxes, and each tax has a definition of its base and a rate schedule. Hence, the introduction or abolishment of any tax, any alteration in the definition of a tax base, and any change in a tax rate schedule, all mean changes in tax structure. But we suppose here that both the kinds of taxes in application and the definitions of their bases are fixed. What we are concerned with, therefore, is changes in tax *rate* structure, namely changes in the relative level of tax rates. We subject

our consideration of changes in tax structure to one further limitation that total tax revenue at the initial income level, T^* , is kept constant. This limitation is needed to separate the effect of changing tax structure *as such* from that of varying total tax yield (at a given level of national income).

Now it is time to plunge into our problem. In this section, we assume that the general sales tax rate, t_s , is constant and concentrate our attention to changes in income tax structure. Since our income tax includes two tax rates, labor income tax rate, t_w , and capital income tax rate, t_p , we can make simultaneous changes in them in the opposite direction without affecting the total tax revenue T^* . What effect on the level of gross national income will be expected from such an adjustment in income tax rates?

Suppose that some infinitesimal changes in t_w and t_p , satisfying the above condition, were made.¹⁾ We have then the following two relationships:

$$dY = \frac{\partial Y}{\partial t_w} dt_w + \frac{\partial Y}{\partial t_p} dt_p, \quad (2.1)$$

and

$$dT^* = \frac{\partial T^*}{\partial t_w} dt_w + \frac{\partial T^*}{\partial t_p} dt_p = 0. \quad (2.2)$$

Solving these two equations, we get

$$dY = (M_p - M_w)R, \quad (2.3)$$

where $M_w = \frac{\partial Y / \partial T^*}{\partial t_w / \partial T^*}$, $M_p = \frac{\partial Y / \partial T^*}{\partial t_p / \partial T^*}$, and $R = \frac{\partial T^*}{\partial t_p} dt_p$. As easily seen, M_w shows the ratio of the increment in Y to that in T^* , both due to a small isolated change in t_w . Let us call this the *labor income tax multiplier*. Similarly, M_p could be named the *capital income tax multiplier*.

¹⁾ For the case of finite changes in t_w and t_p , see note 1, p. 51 below.

R means the increment in total tax revenue (at the initial income level) induced by a change in t_p . The economic meaning of formula (2.3) is as follows; if a change in t_p which is to vary *total* tax revenue at a given income level by R is made, and if the effect on total tax revenue of this change is just offset by that of an opposite change in t_w , the change in t_p as such will affect gross national income by $M_p R$, whereas the change in t_w as such will result in a variation of Y which is equal to $-M_w R$. Consequently, the net change in Y will be the difference between them, that is, $(M_p - M_w)R$.

It is clear from the above that, by calculating M_w and M_p and by comparing them, we can ascertain the effect on income level of a change in income tax structure. Now let us proceed to derive the labor income tax multiplier M_w . Differentiating (1.18) with respect to t_w yields

$$\frac{\partial Y}{\partial t_w} = -\frac{c_w(1-t_s)\alpha Y}{1-E}. \quad (2.4)$$

This expression has the following implication: A small isolated change in t_w will change laborers' consumption at the initial income level by $-c_w(1-t_s)\alpha Y \cdot \partial t_w$. The resulting change in national income can be got by applying the familiar investment multiplier to this initial change in effective demand. It should be noted that, other things being equal, the higher the sales tax rate is, the smaller the initial change in effective demand is. This follows from the fact that a given change in disposable *money* income means a smaller change in disposable *real* income at a higher sales tax rate, so long as income *is* or *will be* spent on consumption.

On the other hand, a change in t_w will also affect the total tax revenue at the initial income level, T^* . Regarding Y as a constant, let us differentiate (1.19) with respect to t_w . Then we have

$$\frac{\partial T^*}{\partial t_w} = (1 - c_w t_s) \alpha Y. \quad (2.5)$$

As shown by this expression, the resulting increase (decrease) of income tax revenue, $\alpha Y \cdot \partial t_w$, is partly offset by a decrease (an increase) of sales tax revenue, $-c_w t_s \alpha Y \cdot \partial t_w$. This is due to the fact that the increase (decrease) of t_w depresses (augments) laborers' real consumption from a given real labor income before income tax.

Dividing (2.4) by (2.5), side by side, we can find the value of the *labor* income tax multiplier :

$$M_w = \frac{\partial Y / \partial T^*}{\partial t_w / \partial t_w} = -\frac{c_w(1-t_s)}{1-c_w t_s}. \quad (2.6)$$

By the same procedure, the *capital* income tax multiplier can also be derived :

$$\begin{aligned} M_p &= \frac{\partial Y / \partial T^*}{\partial t_p / \partial t_p} = -\frac{[c_p(1-t_s)+h][(1-\alpha)Y-D]}{1-E} / [(1-c_p t_s)[(1-\alpha)Y-D]] \\ &= -\frac{c_p(1-t_s)+h}{1-c_p t_s}. \end{aligned} \quad (2.7)$$

Returning to formula (2.3), suppose the direction of the adjustment in question is to lower t_w and raise t_p . In this case, where R is positive, national income would increase or decrease depending on whether the absolute value of the labor income tax multiplier $|M_w|$ is greater or smaller than that of the capital income tax multiplier $|M_p|$. Whether $|M_w| \geq |M_p|$, in turn, depends on

$$\frac{c_w(1-t_s)}{1-c_w t_s} \geq \frac{c_p(1-t_s)+h}{1-c_p t_s}. \quad (2.8)$$

¹⁾ In the case of finite changes in t_w and t_p , we have two equations in place of (2.1) and (2.2) :

$$\Delta Y = \frac{-c_w(1-t_s)\alpha Y^0 \Delta t_w - [c_p(1-t_s)+h][(1-\alpha)Y^0-D]\Delta t_p}{1 - [c_w(1-t_s)(1-t_w^{-1})\alpha + \{c_p(1-t_s)+h\}(1-t_p^{-1})(1-\alpha)]}$$

and

$$(1-c_w t_s)\alpha Y^0 \Delta t_w + (1-c_p t_s)[(1-\alpha)Y^0-D]\Delta t_p = 0,$$

If we put $t_s=0$, the above inequality is reduced to $c_w \geq (c_p + h)^{1)}.$ Thus, so long as we assume that there is no other tax of which yield, at a given income level, may be influenced by changes in income tax rates, we are led to the following proposition: The redistribution of income tax burden from laborers to profit income receivers will increase (decrease) national income if laborers' marginal propensity to spend their disposable income is higher (lower) than that of the profit income receivers.

This proposition is simple and fairly familiar to us. Unfortunately, the matter would become more complicated if we suppose the existence of the general sales tax. From (2.8) we can find that $|M_w|$ is greater or smaller than $|M_p|$ according to

$$c_w - (c_p + h) \geq \frac{t_s}{1-t_s} (1-c_w)h. \quad (2.9)$$

As shown by this inequality, whether $|M_w| \geq |M_p|$ under the sales taxation still depends on $c_w \geq (c_p + h)$, provided that the magnitude of the right side of (2.9) is negligible. This limiting condition, of course, will be met if the value of t_s is quite small. Otherwise, the magnitude of $\frac{t_s}{1-t_s} (1-c_w)h$ would not always be negligible²⁾, though it should be far smaller than c_w or $(c_p + h)$ when plausible values are assumed for the

where t_w^1 and t_p^1 are new income tax rates and Y^0 the initial income. From these two equations, we can get the following expression corresponding to (2.3):

$$\Delta Y = \frac{\left[\frac{c_w(1-t_s)}{1-c_w t_s} - \frac{c_p(1-t_s)}{1-c_p t_s} + h \right] (1-c_p t_s)[(1-\alpha)Y^0 - D]}{1 - [c_w(1-t_s)(1-t_w^1)\alpha + \{c_p(1-t_s) + h\}(1-t_p^1)(1-\alpha)]} \Delta t_p.$$

Thus, whether ΔY is positive or negative still depends on (2.8).

¹⁾ In this case, if we denote $c_w(1-t_w)\alpha + (c_p+h)(1-t_p)(1-\alpha)$ by E' , we have $M_w = \frac{-c_w}{1-E'}$ and $M_p = \frac{-(c_p+h)}{1-E'}.$

²⁾ In the special case where $h=0$ or $c_w=1$, $\frac{t_s}{1-t_s}(1-c_w)h$ is equal to zero under any value of t_s , and we have $|M_w| \geq |M_p|$ according to $c_w \geq c_p$ if $h=0$, or according to $1 \geq (c_p+h)$ if $c_w=1$.

relevant parameters¹⁾. Thus, the above familiar proposition is not necessarily correct under the sales taxation. It should be noted that this conclusion rests on the following premises: (1) The general sales tax is not applied to the sales of investment goods. (2) What should be kept constant, at an initial income level, is not the income tax revenue but the total tax revenue.

There remains the practical question whether the redistribution of income tax burden from laborers to profit income receivers could be reliable as an expansionary measure. The answer to this question would be affirmative if c_w usually exceeds $(c_p + h)$ considerably, since the magnitude of the right side of (2.9) would be relatively small. As regards the marginal propensities to consume at various levels of personal income, their differences might not be so sharp over the range in which most income is earned. Even if this is true, there might be not a slight difference between c_w and c_p , since our Y_p should be regarded as including, as an important component, the corporate business income which usually has a high marginal propensity to save internally. On the other hand, marginal propensity to invest would be negligible as regards labor income, but it might be of considerable magnitude as for profit income in the normal economic situation. Thus, only careful empirical studies could cast a clear light on the question whether c_w is larger or smaller than $(c_p + h)$ and how great is the difference between them. However, it seems rather unplausible that, general speaking, $|M_w|$ differs sharply from $|M_p|$ and changes in income tax structure as such could be relied upon as powerful expansionary or contractive measures²⁾.

¹⁾ For example, if $\frac{t_s}{1-t_s} = 0.2$, $c_w = 0.8$ and $h = 0.4$, $\frac{t_s}{1-t_s}(1-c_w)h$ is equal to 0.016.

²⁾ By taking into account both investment and consumption effects, R. Goode reached the conclusion "that the amount of [individual income tax] revenue raised is the principal determinant of its anti-inflationary effect and that, with a given large yield, differences in progressivity of rates have little influence on total private demand." (*Op. cit.*, p. 152.)

It should be noted, however, that his conclusion is concerned with the effect of individual

Before leaving the issue in this section, a few comments should be added. In our model, income taxes influence the level of consumption (from a given income) only through its effect on disposable income. The inter-temporal substitution effect and the asset effect of income taxation should also be taken into account in the more elaborated models¹⁰. This, of course, would require the reformulation of our consumption functions. It seems difficult, however, to find any empirical or theoretical ground that these two kinds of effects are important enough in comparison with income effect. Furthermore, perhaps, they would have tendencies to be mutually offset. Suppose, for example, a rise in income tax rate reducing the net yields of securities. Its substitution effect would stimulate current consumption, whereas its asset effect on consumption would be depressing since the market prices of securities are lowered in some degree. Also it should be noted that what is relevant here is their influences on the relative, not the absolute, magnitudes of the two income tax multipliers. We think these points furnish sufficient reasons for confining our analysis to the income effect for simplicity.

III

In this section let us consider another kind of adjustment in tax structure, namely, the alteration of the relative weight of direct versus indirect tax yield in a given total tax revenue. For this purpose, it will be convenient to suppose that two income tax rates, t_w and t_p ,

income taxation under the inflationary situation. In depression, it might be possible that h is so low that c_w exceeds $(c_p + h)$ considerably. (This argument, of course, needs a modification of our model; h should be assumed to be dependent on the level of Y , but to be approximately constant over the relevant range of income change.) If this is the case, the policies increasing the progressivity of income tax structure would have expansionary effects.

¹⁰ For the micro-analysis of the inter-temporal substitution effect of income taxation, see B. Hansen, *The Economic Theory of Fiscal Policy*, 1958, chap. VIII and R. A. Musgrave, *op. cit.*, chap. 12.

always move up and down proportionately. Let us put $t_w = t_d$ and $t_p = lt_d$, and assume parameter l is fixed throughout this section. Our problem here is to analyze the effect on Y of the simultaneous changes in t_d and t_s such as keeping T^* constant, and our method of analysis is quite parallel to that in the last section.

As before, we can show the increment in Y resulting from the structural change in question by the following formula:

$$dY = (M_d - M_s)U, \quad (3.1)$$

where $M_d = \frac{\partial Y}{\partial t_d} \Big|_{\partial T^*}$, $M_s = \frac{\partial Y}{\partial t_s} \Big|_{\partial T^*}$, and $U = \frac{\partial T^*}{\partial t_d} dt_d$. M_d shows the ratio of increment in Y to that in T^* , both due to a small change in t_d , namely, small proportional changes in t_w and t_p . Let us call M_d the *general income tax multiplier*. M_s shows the similar ratio when the tax rate is changed in the general sales tax, and could be called the *general sales tax multiplier*. U means the increment of total tax revenue (at the initial income level) caused by a change in t_d . This increment would be wholly offset by a simultaneous change in t_s in the opposite direction.

Now we have two new tax multipliers, of which values should be calculated for comparison. From (1.18) and (1.19), we have

$$\begin{aligned} M_d &= \frac{\partial Y}{\partial t_d} \Big|_{\partial T^*} = - \frac{c_w(1-t_s)\alpha Y + [c_p(1-t_s)+h]l[(1-\alpha)Y-D]}{1-E} \Big/ [(1-c_wt_s)\alpha Y \\ &\quad + (1-c_pt_s)l\{(1-\alpha)Y-D\}] \\ &= - \frac{c_w(1-t_s)\alpha Y + [c_p(1-t_s)+h]l[(1-\alpha)Y-D]}{(1-c_wt_s)\alpha Y + (1-c_pt_s)l[(1-\alpha)Y-D]} \Big/ \frac{1}{1-E}. \end{aligned} \quad (3.2)$$

It should be noted here that M_d is the arithmetical mean of M_w and M_p , weighted by $(1-c_wt_s)\alpha Y$ and $(1-c_pt_s)l\{(1-\alpha)Y-D\}$ respectively. Other things being equal, relatively greater weight will be given to M_w at a lower value of Y or l .

Similarly we have

$$M_s = \frac{\partial Y}{\partial t_s} / \frac{\partial T^*}{\partial t_s} = -\frac{C-A}{1-t_s} \left| \frac{C + \frac{t_s}{1-t_s} A}{1-t_s} \right| = -\frac{C-A}{1-E}. \quad (3.3)$$

Return to formula (3.1), and suppose U is positive, that is, the income tax rates are raised proportionately and the general sales tax rate is reduced so as to keep T^* constant. The change in gross national income, consequent on this tax rates adjustment, would be positive or negative depending on whether the absolute value of the general sales tax multiplier $|M_s|$ is greater or smaller than that of the general income tax multiplier $|M_d|$. By comparing (3.2) and (3.3), we can find that $|M_s| \geq |M_d|$ according to

$$\frac{C-A}{C + \frac{t_s}{1-t_s} A} \geq \frac{c_w(1-t_s)\alpha Y + [c_p(1-t_s)+h]l[(1-\alpha)Y-D]}{(1-c_w t_s)\alpha Y + (1-c_p t_s)l[(1-\alpha)Y-D]}^{1)} \quad (3.4)$$

This condition can be transformed into

$$\frac{C-A}{C} \geq \frac{c_w\alpha Y + \left[c_p + h \left(1 + \frac{t_s}{1-t_s} \cdot \frac{A}{C} \right) \right] l[(1-\alpha)Y-D]}{\alpha Y + l[(1-\alpha)Y-D]}. \quad (3.5)$$

The right side of this latter inequality denotes the weighted average of c_w and $c_p + h \left(1 + \frac{t_s}{1-t_s} \cdot \frac{A}{C} \right)$, where the weights correspond to the shares of total income tax burden, $t_d \alpha Y$ and $l t_d [(1-\alpha)Y-D]$. Thus we can

¹⁾ As for the case of finite changes in t_d and t_s , we can derive the following expression corresponding to (3.1):

$$\Delta Y = \frac{\frac{C^0 \cdot A}{C^0 + \frac{t_s^1}{1-t_s^1} A} - c_w(1-t_s^1)\alpha Y^0 + [c_p(1-t_s^1)+h]l[(1-\alpha)Y^0-D]}{(1-c_w t_s^1)\alpha Y^0 + (1-c_p t_s^1)l[(1-\alpha)Y^0-D]} \times \\ \frac{1-c_w(1-t_s^1)(1-t_d^1)\alpha - [c_p(1-t_s^1)+h](1-l t_d^1)(1-\alpha)}{[(1-c_w t_s^1)\alpha Y^0 + (1-c_p t_s^1)l[(1-\alpha)Y^0-D]]4t_d},$$

where t_d^1 and t_s^1 are new tax rates, and Y^0 and C^0 are the initial levels of income and consumption respectively. As shown by this expression, whether ΔY is positive or negative depends on the condition quite similar to (3.4).

conclude that, so long as the average value of c_w and (c_p+h) , weighted by the shares of total income tax burden, is no less than $\frac{C-A}{C}$, the structural change increasing the relative weight of income tax yield would surely decrease gross national income.¹⁾

There is one interesting point to be noted: The sufficient condition for $|M_d| > |M_s|$, just referred to, would be met rather plausibly for reasonable values of various parameters when the initial income level is quite low. This is mainly due to the following two facts: On the one hand, the value of $|M_s|$ will move rather sensitively in the same direction with that of C/A , and hence with that of Y . For example, assuming $\frac{t_s}{1-t_s} = 0.1$, the numerator of $|M_s|$ will be 0.8 if $C/A=5.4$, 0.6 if $C/A=2.65$, and only 0.5 if $C/A=2.1$. On the other hand, it would not be reasonable to suppose that $|M_d|$, which is the average of $|M_w|$ and $|M_p|$, has a similar tendency²⁾ and that the value of its numerator falls short of, say, 0.6 at a very low income level.

It has often been held that, in depression, the reduction of the indirect tax yield would have favorable effect on income level, even if it is wholly offset by the increase in income tax yield. The above consideration is far from supporting this familiar proposition. Hence, we should examine the general sales tax multiplier more closely. This multiplier is based, in our model, on the assumptions that real consumptions are functions of real disposable incomes, and that the inter-temporal substitution effects of taxation are negligible. Under these assumptions,

¹⁾ If we put $h=0$ and $c_w=c_p=c$, the inequality (3.5) is reduced to $\frac{C-A}{C} \geq c$. Thus, in the most simplified system where investments are autonomous and the marginal propensity to consume is the same in all income classes, the structural change in question decreases Y so long as c is greater than $(C-A)/C$.

²⁾ Since a decrease in Y will increase the weight attached to $|M_w|$ relatively, $|M_d|$ could have a similar tendency only if the value of $|M_w|$ is considerably smaller than that of $|M_p|$. It would be difficult to suppose that such a condition will be met.

total consumption can be regarded as consisting of two parts: One is quite independent of income level and tax rates, and the other dependent on them. As shown by (3.3), the value of $|\frac{\partial Y}{\partial t_s}|$ is proportional to the initial magnitude of the 'dependent' part, whereas the value of $\frac{\partial T^*}{\partial t_s}$ is nearly proportional to the initial magnitude of total consumption which is the base of general sales tax. The lower the income level, the smaller the weight of the 'dependent' part in total consumption. Thus, it follows that the ratio of $|\frac{\partial Y}{\partial t_s}|$ to $\frac{\partial T^*}{\partial t_s}$, namely, our $|M_s|$ is smaller at a lower level of initial income. This result would be important so long as the 'independent' part or autonomous consumption is of considerable magnitude.¹⁾

The situation would be quite changed, if we suppose some kind of money illusion on the part of consumers. Since the problem has already been considered by E. C. Brown,²⁾ short comments would be enough. Under Brown's pure money illusion, consumers' expenditures including sales tax are assumed to be determined by the levels of their disposable *money* incomes; if we want to incorporate this assumption into our total consumption function, (1.17) should be changed into the form

$$C\left(1 + \frac{t_s}{1-t_s}\right) = c_w(1-t_w)\alpha Y + c_p(1-t_p)[(1-\alpha)Y - D] + A. \quad (3.6)$$

As easily seen from this expression, sales taxation in this case reduces real consumption, at a given income level, just by the amount of the sales tax yield. Accordingly, the general sales tax multiplier under the

¹⁾ If we neglect this part and suppose that real consumption is always a constant ratio of disposable real income, the general sales tax multiplier becomes independent of the initial income level: As easily seen from (3.3), its value is always equal to $-\frac{1}{1-E}$. However, it would not be adequate to assume such a consumption function in short-run analysis.

²⁾ E. C. Brown, "Consumption Taxes and Income Determination," *American Economic Review*, March, 1950, pp. 76-81.

pure money illusion is always equal to $-\frac{1}{1-E}$. On the other hand, the general income tax multiplier, of course, will not be influenced by the money illusion. As shown by (3.2), the absolute value of its numerator surely falls short of 1 so long as both c_w and $(c_p + h)$ are less than 1. Now the familiar proposition that indirect taxation is more deflationary than income taxation becomes very plausible. It seems difficult, however, to find the reason why the pure money illusion is a realistic supposition. Especially so if Y is low, since consumers are usually more deliberate on their expenditure plans when their income levels are low.

We must add a few comments upon the inter-temporal substitution effect and asset effect of sales taxation. Provided that the lowering of sales tax rate is expected to be permanent, it would not induce any powerful inter-temporal substitution effect. So far as the interest rate is kept constant, as we supposed, the gain from the postponement of current consumption would not be changed. Only the stimulus to the savers who have no definite plan for future spending would be weakened, since they cannot enjoy so much reduction in sales tax burden as before when they refrain from spending a certain amount. On the other hand, if the lowering of sales tax rate is expected to be a temporal one, the acceleration of spending would surely be advantageous for consumers; and this effect, especially in the purchase of durable goods, might strengthen considerably the expansionary effect of sales tax reduction. But when national income is low, as in depression, the lowering of sales tax rate would not be accompanied by a definite expectation of the rate increase in near future, and, moreover, the consumers' financial positions are not so favorable to the acceleration of spending.

As for the asset effect of the sales tax reduction, we should pay attention not only to a variation in the price level of consumer goods induced by the tax but also to a change in money supply. For keeping

the interest rate unchanged as we supposed, total amount of money supply should be changed in the same direction with a change in sales tax rate. Hence, it would not seem plausible to expect a strong expansionary asset effect on consumption from the sales tax reduction.

All in all, even if we pay some attention to the possibilities of the money illusion, inter-temporal substitution effect and asset effect, it is not convincing enough to say that sales taxation in depression would be more deflationary than income taxation yielding the same amount of revenue. If the results of our considerations are acceptable, it is in the normal economic situation that the traditional conviction seems to stand on better grounds. So far as the inflationary situation is concerned, there are many subtle problems, such as those discussed by R. Goode,¹⁰ which could not be dealt with by our model.

CONCLUSIONS

In this paper, we built up a model including multi-tax system, and derived several tax multipliers from it. These multipliers have been used for analyzing the effect of changes in tax structure on the level of national income. As for the change in income tax structure, we have stressed the point that what is important for determining its effect on national income is the comparison of the marginal propensity to spend between labor and capital incomes but we should also pay due attention to the repercussion of income tax rates adjustment on the indirect tax revenue. As regards the structural adjustment changing the relative weight of income versus sales tax yield, we have focused our attention to the depressionary situation and have criticized the contention that indirect taxation is especially deflationary, through the re-examination of various factors determining the value of the general sales tax multiplier.

¹⁰ See Goode, *op. cit.*, pp. 154-59.

Great caution should be exercised in drawing the conclusions of practical importance from a formal argument such as ours. Especially so, since we have been obliged for simplicity to make some disputable assumptions and to neglect several relevant issues of importance. Yet it seems justifiable to make the following suggestions: So long as the total tax revenue at an initial income level is to be kept constant, changes in tax structure usually could not be relied upon as the powerful expansionary or contractive weapons. More important considerations in the selection among the feasible tax structures will be, for example, their effects on the distribution of disposable real income and on the allocation of resources.

